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The Economy

U.S.S.R.

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U.S.S.R.

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This chapter supersedes the economic coverage in the General Survey dated March 1971.

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The Economy

A. General

1. Introduction (C)

During the post-World War II period the U.S.S.R. has developed the second most powerful economy in the world, one that has grown since 1950 from one-third to about half the size of the United States economy. At times Soviet ebullience over their economic prospects vis-a-vis the United States and the capitalist world in general reached hyperbolic extremes such as Khrushchev's pledge in 1960 to overtake the United States in the production of major industrial and agricultural commodities by 1971. Yet the past decade has witnessed generally lower rates of growth—particularly in the early 1970's—compared with those experienced in the 1950's. At the same time other industrialized countries, notably West Germany and Japan, as well as newcomers such as Israel, Taiwan, and Brazil stepped up their rates of economic growth to rates exceeding that of the Soviet economy. Both the Soviet record and the Soviet model of development have suffered unavoidably by comparison. Nevertheless, the Soviet economy is now so large that its continued growth, although at even a slower pace, provides the necessary wherewithal to insure the preservation of power by the party, to support an extensive defense effort, to fund manifold scientific programs, and to extend Soviet power and influence abroad.

The U.S.S.R. has attained this position of ascendancy on the world scene by relentlessly pursuing national policies determined by the self-perpetuating elite at the top of the Communist Party. These decisions are translated into long-term and annual

plans for all segments of the economy: industry, agriculture, consumption, investment, defense, research and development, labor, foreign trade and aid. An elaborate bureaucratic apparatus insures compliance with these goals by each factory, farm, and commercial enterprise through a system of detailed directions and regulations that leaves little room for individual initiative, entrepreneurship, or the play of factors working toward economic rationality. As a result, the unquestioned achievement of rapid economic growth during the past half century has been realized at great cost in terms of waste, inefficiency, and human suffering. Another consequence of this pattern of development was the long-time subordination of the Soviet consumer, whose demands on the economy's resources came after those made for investment and defense. After Stalin, and particularly since General Secretary Brezhnev's rise to power, however, Soviet planners have paid more heed to the demands of the consumer, although defense and investment maintain their preferential position on the scale of allocational priorities.

By means of their ability to enforce major priorities, the Soviets have been able to mount and sustain programs comparable to those in the United States in the areas encompassing the sinews of national power. Thus, although the U.S.S.R.'s total economic output is only half that of the United States, in 1972 their defense expenditures equaled those of the United States (measured in U.S. dollars) and their investment effort actually exceeded the U.S. level by a small margin. Accordingly, the relative shortchanging in terms of forgone consumption has continued for the average citizen despite the considerable improvement achieved during the past 20 years since the death of

Stalin. On a per capita basis, consumption in the U.S.S.R. is about one-third that in the United States, a ratio that has not changed appreciably for many years. This comparison, moreover, fails to take into consideration serious limitations in terms of variety, quality, and availability that plague most consumer goods and services in the U.S.S.R.

Aside from a few specific areas such as large helicopters and hydroelectric generating equipment, Soviet production technology in general lags significantly behind the level prevailing in the United States, Western Europe, and Japan. In part this is because the Soviet system militates against the spillover or transfer effect into the civilian economy of technological triumphs in the military and space fields. Of greater importance is the Soviet economic bureaucracy, which is generally unreceptive to technological and managerial innovation. Nevertheless, the gap in per capita output between the U.S.S.R. and the United States continues to close in the production of primary energy, certain industrial materials, some foodstuffs, and heavy industrial goods. On a sheer volume basis, the Soviets already outproduce the United States in steel, coal, and cement.

2. Resource position (C)

The Soviets have achieved their position of primacy in the Communist sphere and as the second largest economy in the world by the relentless development of their resources in the direction of industrialization on the basis of centralized planning and direction from above. The basic wealth of the country in land, labor, fuels, and industrial raw materials was evident in the quarter century before World War I as industrialization began to accelerate in Imperial Russia. Stalin resumed this course with a vengeance once the Civil War and the disorders encountered in the decade following the Bolshevik seizure of power were surmounted. Both Khrushchev and the Brezhnev-Kosygin regime have pursued this same goal of industrial growth, albeit with important variations resulting from the abiding agricultural problem, rising consumer expectations, and the imperatives of modern technology.

The U.S.S.R. is the largest country in the world, occupying roughly one-sixth (8.6 million square miles) of the earth's total land area and having the third largest population (almost 250 million at the end of 1972) after China and India. The country possesses vast resources of energy, metals, minerals, and fuels, and produces significant amounts of basic industrial products (Figure 1). Reserves are particularly extensive

in waterpower, fossil fuels, forest, iron ore, manganese, copper, chromite, lead, zinc, nickel, potassium, and phosphates. As the more readily accessible deposits are exploited, however, the Soviets must increasingly turn to reserves that are affected by a combination of such factors as lower quality, great distances from the major consumption centers, or located in climatically severe regions or areas of difficult terrain.

Demand for raw material resources has mounted steadily to satisfy growing internal needs and to maintain a high level of exports; exports of industrial raw materials have been used to further the integration and dependence of East Europe on the U.S.S.R. and to earn foreign exchange. As a result, the Soviet extractive industries are characterized by generally high and rising costs, which has led Moscow to explore seriously the possibility of joint ventures with Western partners to develop these resources. The agricultural resource base of the U.S.S.R. is relatively meager, with 27% of the land mass classified as usable agricultural land and only 11% as arable. Climatic and geographic extremes—rigorous winters, extensive deserts and swampland, inadequate irrigation, and sizable variations in temperature and moisture levels—further restrict the potential of the Soviet countryside.

Soviet stocks of productive fixed capital (plant and equipment, including the value of basic herds and draft animals) amounted to 510 billion rubles at the end of 1972, almost three times the level of 1960.¹ Accumulation of this capital stock has been extraordinary since 1950; annual percentage additions averaged more than 9%, a rate rarely equaled in any advanced economy for a sustained period of time. The Soviet leadership apparently realizes that this unusually high rate of capital formation must now be tempered somewhat because of diminishing returns on capital and because of the need to boost consumption. The 1971-75 plan calls for an average annual increase of 8% in productive fixed capital. Although still high by world standards, this nevertheless reflects a downward adjustment.

The industrial sector holds slightly more than half of Soviet productive fixed capital with agriculture accounting for about one-fifth. These proportions should gradually change as the share of new investment devoted to agriculture continues to rise. Compared with the United States, the stock of Soviet productive fixed capital is only slightly smaller, but by Western standards it is obsolescent.

The Soviet labor force of 128.1 million persons in 1972 was about 45% greater than that of the United

¹Undepreciated value expressed in new rubles at 1955 prices.

FIGURE 1. Strategic supply position, 1971 (S)
(Millions of metric tons unless otherwise indicated)

| | PRODUCTION | IMPORTS | EXPORTS | APPARENT CONSUMPTION* | PRODUCTION AS A PERCENT OF APPARENT CONSUMPTION** |
|--|------------|----------|---------|--------------------------|--|
| Electric power (billions of kw.-hrs.)..... | 800.4 | 0.0 | 6.7 | 793.7 | 100.8 |
| Crude oil..... | 371.8 | 5.1 | 74.8 | 302.1 | 123.1 |
| Petroleum products..... | 269.0 | 1.5 | 30.3 | 240.2 | 112.0 |
| Natural gas (billions of cubic meters)..... | 212.4 | 8.1 | 4.6 | 215.9 | 98.4 |
| Coal..... | 592.0 | 8.0 | 24.9 | 575.1 | 102.9 |
| Iron ore..... | 203.0 | 0.0 | 36.5 | 166.5 | 121.9 |
| Pig iron..... | 89.3 | 0.1 | 5.1 | 84.3 | 106.0 |
| Rolled ferrous metals..... | 99.4 | 3.4 | 7.4 | 95.4 | 104.2 |
| Copper, refined..... | 1.2 | ***Negl. | 0.2 | 1.0 | 116.6 |
| Tin, primary (thousands of metric tons)..... | 22.0 | 4.0 | 0.0 | 26.0 | 84.6 |
| Aluminum†..... | 1.8 | Negl. | 0.5 | 1.2 | 142.2 |
| Lumber (millions of cubic meters)..... | 119.0 | 0.3 | 7.9 | 111.3 | 106.8 |
| Cotton, ginned..... | 2.4 | 0.2 | 0.5 | 2.1 | 114.4 |
| Rubber††..... | 1.0 | 0.3 | 0.1 | 1.2 | 85.0 |
| Cement..... | 100.3 | 5.4 | 3.4 | 97.3 | 103.1 |
| Grain†††..... | 140.2 | 2.7 | 7.9 | 135.0 | 103.9 |

*Apparent consumption differs from actual consumption in that it does not take into account the storage or withdrawals from storage of material goods.

**Percentages calculated from rounded data.

***Negligible.

†The production figure is for primary aluminum only; the import and export figures include some rolled aluminum and duralumin.

††All domestic production consists of synthetic rubber; imports consist of both natural rubber and synthetic rubber. Exports consist largely of synthetic rubber, but include some natural rubber supplied to East Germany.

†††Average for 1968-71. Because of large fluctuations in domestic production of grain and in imports and exports of grain from year to year, use of average annual quantities for several years provides a more reliable indication of the Soviet strategic supply position in grain than does use of the figures for a single year.

States although the population of the U.S.S.R. was only 20% greater. Over half of the total Soviet population is in the labor force compared with about 40% in the United States. This phenomenon is largely explained by the much higher rate of participation of women in the Soviet labor force than in the United States; two-thirds of all Soviet women 16 years of age or older work as against only two-fifths in the United States. The productivity of many of these women is especially low even by Soviet standards because they are forced by the need of most families for a second income into arduous, poorly remunerative work in agriculture, construction, and services.

The structure of the Soviet labor force has changed significantly since the mid-1950's. The share of the total civilian labor force in the agricultural sector dropped from 50% in 1955 to 30% in 1973; even so, the Soviet labor force in agriculture is roughly eight times that of the United States because Soviet labor productivity on the farms has remained at a constant and lowly 11% of the U.S. level for nearly 20 years (the comparable figure for industry is about 40%). Most of the growth in nonagricultural employment has taken

place in transportation, construction, trade, and services. Compared with the United States, the U.S.S.R. has appreciably fewer people employed in the latter two sectors, but the two countries have approximately the same proportions of workers in industry, construction, transportation, and communications. Outside of the civilian labor force, the military accounts for about 3% of total employment in both countries.

A summary statement on the U.S.S.R.'s resource position must conclude that the country is fortuitously well endowed with substantial natural and human resources. Although these resources have been complemented by an official ideology emphasizing rapid economic growth and directed by a virtually unchallenged, totalitarian government committed to this end, the notable accomplishments of the Soviet economy, it can be argued, could well have been significantly greater if institutional restraints, perverse incentives, hostility to innovation, and the lack of managerial dynamism had not combined to retard economic growth. However, as these and other factors are indisputably part and parcel of the Soviet system,

the more persuasive case seems to be that the theoretical potential of the economy's growth cannot be realized by a wide margin under the present system, which gives no sign of changing in any significant degree.

3. Economic growth (S)

Soviet economic growth began to slow down in 1970 as the result of declining rates of increase in the combined productivity of labor and capital. During the 1950's, gross national product (GNP) increased at an average annual rate of 6.3%, but this rate of growth fell to 5.1% during 1961-65. The rate of growth of factor productivity increased somewhat in the last half of the 1960's, boosting the average annual increase in GNP to 5.6% per year during this period. In 1971-72, however, economic growth again turned sharply downward, and GNP grew by an average of only 2.4% annually. Principal causes of the 1972 slump in particular, when GNP grew by only 2%, were a harvest failure caused by unfavorable weather conditions, lags in the installation of new industrial capacity, and negligible gains in factor productivity. As a result, the major goals of the 5-year plan for 1971-75 were probably out of reach before the plan period was half completed.

Problems in both agriculture and industry were responsible for most of the slowdown in 1971-72. Agricultural production in the latter year was about 7% below the 1971 level and 7.5% under the all-time high of 1970. In 1971 the industrial rate of growth dropped to 5% compared with the average 7% per

year registered during the preceding decade. Harvest shortfalls in 1971 restricted the supply of agricultural raw materials to industry in 1972, thus contributing to a further reduction in industrial growth to 4.5%. Most of the decline, however, resulted from three shortcomings within the industrial sector itself: the failure to bring new plant and equipment into production on schedule, the inability to achieve planned increases in factor productivity, and continuing dereliction in economizing in the use of industrial raw materials. As Figure 2 indicates, overall industrial growth in 1971-72 was influenced by sharply diminished growth in the production of consumer nondurable goods and machinery. The output of industrial materials, the third component of the official U.S. index of Soviet industrial production, also fell below both the rates of increase achieved in the 1960's and those required to fulfill the 1971-75 plan.

Although 1971-75 plan goals for industrial production are predicated on large increases in factor productivity, the combined productivity of labor and capital in industry rose by only 0.5% in 1972. Capital productivity in industry continued to decline and only small gains were registered in labor productivity (Figure 3). Combined factor productivity for the economy as a whole declined by 2% in 1972, mainly because of the situation in the agricultural sector where increases in investment kept pace with high plan goals, but output declined sharply.

The Soviets are counting heavily on technological progress as the key to reversing trends in productivity

FIGURE 2. Indicators of economic growth (C)
(Percent per year)

| | 1951-60 | 1961-65 | 1966-70 | 1971-72 | 1971-75 PLAN |
|--|---------|---------|---------|---------|-----------------|
| Gross national product (GNP)*..... | 6.3 | 5.0 | 5.6 | 2.8 | 5.9 |
| Agricultural production index**..... | 4.0 | 2.1 | 4.4 | -3.4 | 3.7 |
| Industrial production index*..... | 9.6 | 6.8 | 6.4 | 5.5 | 8.0 |
| Industrial materials..... | 9.7 | 7.1 | 6.1 | 5.3 | 7.0 |
| Machinery..... | 10.3 | 7.8 | 7.1 | 7.6 | 11.4 |
| Consumer nondurables..... | 8.7 | 4.5 | 6.4 | 2.6 | 6.4 |
| Selected components of GNP by end use: | | | | | |
| Consumption..... | 4.6 | 3.5 | 5.4 | 4.5 | |
| Defense..... | 1.3 | 2.0 | 3.0 | 0.0 | |
| Gross fixed investment***..... | 12.6 | 6.3 | 7.5 | 6.9 | |
| Agricultural investment***..... | 12.2 | 11.7 | 8.2 | 11.3 | |
| Industrial investment***..... | 11.7 | 7.0 | 7.0 | na | |

*Based on U.S. official estimates of GNP at factor cost computed in ruble values.

**Based on U.S. official estimates of net agricultural production in ruble values (adjustment has been made to eliminate the double counting inherent in Soviet gross output data on such items as feed and seed).

***Based on official Soviet investment statistics expressed in ruble values.

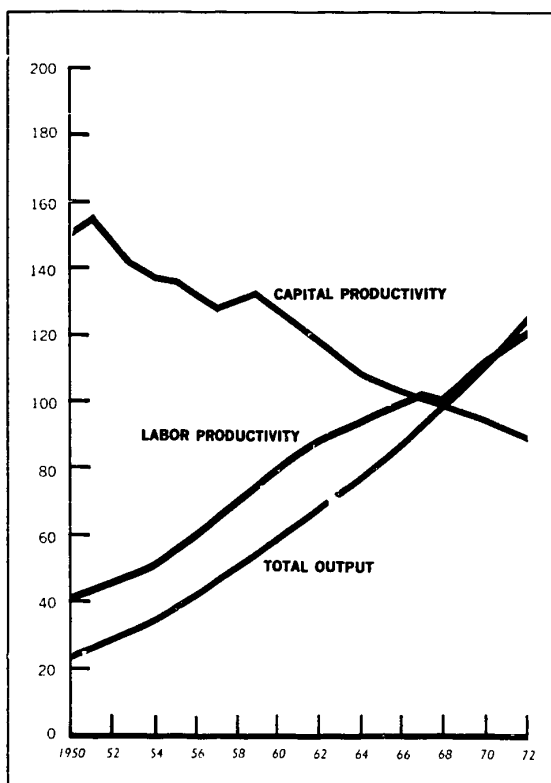
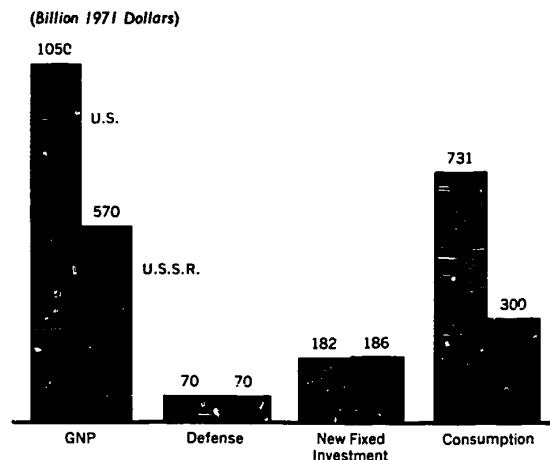


FIGURE 3. Indexes of output and factor productivity in industry, 1950-72 (C)

growth. Indeed, the 1973 planned increases in output in industry, agriculture, and construction are to be achieved with minimal increase in employment in these sectors. Thus far, however, the reforms in applied research and development introduced after 1965 have had little effect. This area is still characterized by inefficiency, poor coordination, and the unwillingness of enterprise managers to adopt new products and processes.

The economic slowdown in 1971-72 was reflected in lower growth rates of components of GNP by end use. Consumption, which grew by only 4.5% annually during 1971-72, was depressed chiefly by the poor harvest that tightened food supplies. Although growth in consumption in 1971-72 fell below the 5.4 annual percentage rate registered in 1966-70, it was above the average 3.5% rate of growth during 1961-65. Growth in defense expenditures fell from 3% in 1966-70 to an average of 0% during 1971-72, but this decline was not related to economic shortfalls in these years; defense spending was in a cyclical trough in the early 1970's. Such expenditures will begin to grow again as strategic



The categories shown do not exhaust the total. The difference is accounted for by administration, civil space programs, changes in inventories, net exports and statistical discrepancies.

FIGURE 4. U.S. and U.S.S.R. GNP by end use, 1971 (C)

programs now in the research, development, and testing phases are deployed. Figure 4 shows the distribution of Soviet CNP by end use in 1971 compared with U.S. GNP.

The 6.9% rate of growth of new fixed investment during 1971-72 was above plan, and the share of investment in GNP reached almost one-third of the total. Much of the increase in investment, however, was in the form of unfinished construction. Many projects were not completed on schedule, and industry had to do without productive capacity that was to have been commissioned during 1971-72. The leadership hoped to curtail this dispersion of investment resources in 1973 by cutting the planned growth of investment to 3.5%, or by more than half the rate of increase achieved in 1971-72. At the same time the growth rate of commissionings of fixed capital was raised from 5.8% in 1972 to 11% in 1973.

As a result of the poor economic performance of 1972, Soviet GNP declined as a share of U.S. GNP to 52% from 54% in 1971, and the dollar gap between the two countries' national product continued to widen (Figure 5). Most of this gap is accounted for by the low level of consumption in the U.S.S.R. relative to that in the United States; expenditures for defense and investment were about equal. Selected indicators of per capita production in the two countries in 1960 and 1971 are shown in Figure 6.

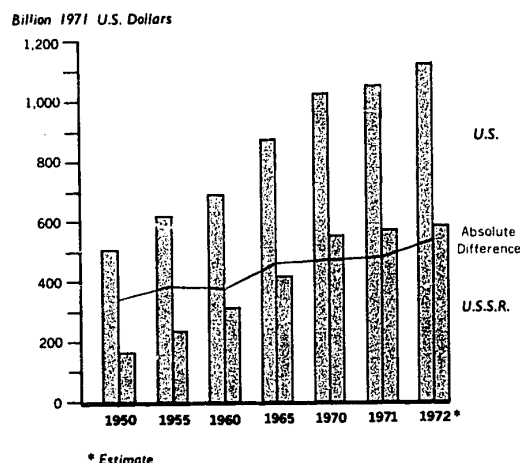


FIGURE 5. Comparison of U.S. and U.S.S.R. GNP (U/OU)

4. International economic relations (S)

Soviet foreign trade turnover (imports plus exports) was valued at over \$26 billion in 1971, more than double the 1960 level. Soviet exports—about \$13.8 billion in 1971—accounted for less than 3% of Soviet GNP, and the U.S.S.R. conducts less foreign trade

than the Netherlands. As such, Soviet foreign trade is only an adjunct to the domestic economy.

The foreign trade of the U.S.S.R. is oriented largely toward other Communist countries, although since 1960 the share of trade with the non-Communist world has risen from about one-fourth to one-third of total turnover. Increased commerce with non-Communist countries is accounted for chiefly by the rapid growth in trade with the industrial West during 1966-71. Soviet attempts to further the integration of trade with East Europe have been largely unsuccessful, although there appears to have been some progress in recent years. At the same time the U.S.S.R. realizes that the developed West is the primary source of its most critical imports, ranging from high technology products to grain, and that it must ship to the West increasing amounts of fuel and raw materials traditionally exported to East Europe to pay for these processes and products. This is because Soviet manufactures are generally of low quality or otherwise noncompetitive in most Western markets.

The U.S.S.R.'s imports over the last decade have been dominated by industrial equipment and certain consumer goods. Machinery and equipment, almost three-fourths of which originated in East Europe, was the largest single category of imports. Imports of these items from the West, much of which contain

FIGURE 6. U.S. and U.S.S.R.: Selected indicators of per capita production, 1960 and 1971 (C)

| | | | U.S.* | U.S.S.R. |
|-----------------------|--------------------------------|------|-------|----------|
| GNP..... | 1971 dollars..... | 1960 | 3,818 | 1,451 |
| | | 1971 | 5,072 | 2,322 |
| Primary energy**..... | Metric tons***..... | 1960 | 7.9 | 3.1 |
| | | 1971 | 10.3 | 5.3 |
| Crude steel..... | Kilograms..... | 1960 | 498 | 305 |
| | | 1971 | 527 | 493 |
| Plastics..... | do..... | 1960 | 15.8 | 1.5 |
| | | 1971 | 46.1 | 7.6 |
| Automobiles..... | Units per 1,000 persons..... | 1960 | 36.9 | 0.6 |
| | | 1971 | 41.5 | 2.1 |
| Cement..... | Kilograms..... | 1960 | 310 | 210 |
| | | 1971 | 348 | 409 |
| Housing..... | Square meters constructed..... | 1960 | 0.8 | 0.5 |
| | | 1971 | 1.0 | 0.4 |
| Grain..... | Kilograms..... | 1960 | 1,004 | 434 |
| | | 1971 | 1,140 | 604 |
| Meat..... | do..... | 1960 | 71 | 83 |
| | | 1971 | 26 | 36 |
| Radios..... | Units per 1,000 persons..... | 1960 | 99.4 | 19.4 |
| | | 1971 | 97.8 | 35.9 |

*Based on U.S. official estimates.

**Excludes energy from minor types of fuels such as peat, oil shale and fuel wood.

***Energy expressed in coal equivalents with a caloric value of 7,000 kilo calories per kilogram.

advanced technology unavailable elsewhere, has been in support of Soviet industrial development. Soviet imports of consumer goods from the West have also risen rapidly during this period, with deliveries of foodstuffs reaching significant levels during 1964-66 and after 1969.

Soviet exports during the past decade have consisted basically of fuels, raw materials, and semifinished materials. Exports of machinery and equipment have increased, primarily to other Communist countries and to the less developed countries. Food exports have regained much of their former importance after a sharp decline in 1964-66, but should decline again during 1972-73 following Soviet grain crop shortfalls in 1972.

The Soviet hard currency balance of payments has been in substantial deficit during most of the past decade. During 1960-1965 the U.S.S.R. financed these deficits largely through sales of gold. Since 1965, however, the U.S.S.R. has made increased use of Western credits to finance its imports from the West and has sold virtually no gold. As a result, gold reserves have climbed from a low of 900 tons in 1965 to 1,800 tons by the end of 1972. The U.S.S.R. will be faced with substantial hard currency deficits in 1972-73 due primarily to the almost \$2 billion in grain imports from the West, but the Soviets are expected to finance these purchases without resorting to massive gold sales.

By the end of 1972 the U.S.S.R. had extended about \$16.2 billion in economic assistance to Communist countries and about \$8.3 billion to less-developed countries in the third world. Communist countries have drawn about 85% of the commitments whereas the non-Communist countries have drawn only about half of their aid on the books. Annual extensions of new aid to Communist countries averaged \$2.1 billion in 1971-72 compared with \$1.1 billion in 1969-70; comparable figures for the less developed countries were more than \$900 million and \$580 million.

In recent years the U.S.S.R. has been more selective in choosing recipient countries in the underdeveloped world, an approach intended to make the economic assistance program a more effective political instrument for expanding Soviet influence. As a result, the U.S.S.R., responsible for more than half of all Communist economic aid extensions since 1954, accounted for only about one-third of Communist aid extended during 1972. This has also resulted in aid dispensations being concentrated in a few countries, with India, Egypt, Afghanistan, and Iran accounting for about half of total Soviet aid extended to underdeveloped countries since 1954; these four countries have drawn two-thirds of total Soviet aid actually delivered.

Since 1955 the U.S.S.R. has committed \$8.5 billion of military aid to the underdeveloped countries, with more than half of this amount extended since 1966. The Soviets, however, agreed to only \$310 million in arms assistance in 1972 compared with record military extensions averaging nearly \$1.2 billion in 1970 and 1971. This decline reflected the unusually high level during 1970-71 of acquisitions by Egypt to build up its air defenses and by India to prepare for the war with Pakistan. An estimated \$7.1 billion or 85% of Soviet military equipment on order had been delivered by the end of 1972. Fully 93% of Soviet military exports in 1972 went to Egypt, India, Iran, Iraq, and Syria, with Egypt alone receiving more than 35% of the total.

B. Economic policy and development

1. Goals and policy (U/OU)

Since the beginning of centralized economic planning in 1928, the primary goal of Soviet economic planning has been the rapid development of the country on the basis of forced industrialization. During the first decade this policy was predominantly inward-looking because of the need to complete the draconian collectivization of agriculture to provide the resources—primarily labor and forced savings—to fuel the industrialization program. Fortunately for the Kremlin, relative international calm prevailed during most of this period in Europe, but by the late 1930's the Soviets realized that they had to accelerate the development of a military arsenal to insure their survival as a nation and as a political system. The U.S.S.R. emerged from World War II with a badly damaged economy but with greatly increased prestige, a unified if terrified and browbeaten party, and a determination to recover its economic power by following the same policies that made preservation of the state and the system possible in the first place. By the time of his death in early 1953, Stalin had brought the Soviet Union back to roughly the level of economic output that prevailed before the war.

During the 20 years since Stalin's demise his successors have persisted in this course despite the mounting evidence that the Soviet economic model as developed by and inherited from Stalin is increasingly ill-suited to meeting the demands for growth in a complex, industrialized economy. The centralized allocation of resources through administrative action together with forced draft industrialization worked well enough during the early stages of the U.S.S.R.'s development, although at considerable cost in terms of waste, inefficiency, and human suffering. However,

the slippage of Soviet growth indices during the past 15 years that is evident both from official Soviet statistics and from independent Western analyses testifies to the increasing inappropriateness of the Soviet economic system as well as to the patent need for its fundamental reform.

During the mid-1950's the need for such reform was masked by the economy's rebound from the relative relaxation of Stalinist controls under Khrushchev. Khrushchev also promulgated a series of programs such as the New Lands campaign in agriculture and "chemicalization" in industry that resulted in essentially one-time increments to economic growth. But the impact of these and other measures was largely spent by the end of the decade, and Khrushchev found himself faced with increasing economic difficulties, the combined effect of which was to turn the most critical growth rates downward.

The Brezhnev-Kosygin regime that succeeded Khrushchev has been remarkable for its stability in all areas, including the economy. Thus, despite several initiatives aimed at altering the Soviet economic scene somewhat, the net result of the Brezhnev-Kosygin stewardship has been no appreciable change from the basic Stalinist pattern devised almost half a century ago. Consumption has been accorded a higher priority than that given it as recently as 10 years ago, but the steady yet relatively meager gains in this area underscore the regime's continuing belief that high rates of growth and a creditable defense posture depend primarily on substantial increases in investment (especially in heavy industry), better education and training, and the successful incorporation of new technology. There has not been a basic reallocation of resources which would necessarily reflect new priorities. As a result, the Soviet economic system continues essentially unchanged despite the new demands levied on it both by the country's leadership and by the imperatives of growth in the advanced industrial age.

2. Economic administration and control (U/OU)

As in other aspects of Soviet life, the Communist Party administers and controls nearly all economic activity in the U.S.S.R. Ultimate authority for economic policy resides in the Politburo of the party's Central Committee, which relies on the Council of Ministers for policy implementation. This small body is both the highest level of the executive arm of the government and the apex of the economic administrative structure. Ample assurance that the party's economic policies will be carried out by the government hierarchy is provided by the interlocking

membership at the top levels of both bodies; Kosygin and Mazurov, for example, are full members of the Politburo as well as chairman and first deputy chairman, respectively, of the Council of Ministers. Adherence to the party's guidelines by government bodies at subordinate levels is insured by a strategic distribution of party members in government posts down to and including the local soviets. At the lowest level of economic organization, the enterprise, the party wields its influence through the primary party organization, i.e., the party members in the enterprise, as well as through top management, which typically consists of party personnel.

The country's highest legislative body, the Supreme Soviet, generally meets only twice a year for proceedings lasting only a few days. As such, it cannot and does not initiate economic measures, but in rubberstamp fashion signs into law directives formulated by the Politburo and transformed into operational plans by the Council of Ministers and its staff organizations. These latter entities include the State Planning Commission (Gosplan), the more than 50 functional economic ministries (ferrous metallurgy, fishing, petroleum, etc.), and a host of state committees and main administrations concerned with finance, prices, supply, and the like.

The emphasis of Soviet economic administration since the late 1920's has alternated between the stress on functionalism (all enterprises in the country engaged in a particular economic activity grouped under a single ministry) and regionalism (all enterprises in a given area grouped under a regional entity regardless of the nature of their activities). Over time each type of administration tended to generate its own peculiar excesses and thus created growing pressure to shift over to the alternative method. For example, under the ministerial system the locus of concern in any given industrial ministry is that particular industry, often at the expense of overall state interests or those of areas in which the industry is especially important. The regional system, however, leads to localism to the increasing detriment of national interests as well as those of the individual industries and other economic sectors. As a consequence, the ministerial system has been the more common method of economic administration and has been used since 1965 shortly after the Brezhnev-Kosygin leadership took over from Khrushchev. (The Government and Politics chapter of this survey shows the ministerial structure of the U.S.S.R.)

Khrushchev's ouster in 1964 can be ascribed in part to the malfunctioning of the system of regional economic management that he decreed in mid-1957 in

response to the defects of the ministerial system then prevailing. Under Khrushchev's regional system, administration of all enterprises except those in defense-related areas and in broad service lines (transportation, communications, etc.) was subordinated to *sovnaarkhozy*, an acronym for "regional councils of the national economy." The imperfections inherent in this type of economic administration soon became manifest, but Khrushchev's answer was to restructure these regional councils and to divide the party into industrial and agricultural segments.

During the later Khrushchev years the major economic growth rates began an unmistakable decline from the unusually high percentage increments registered in the mid- to late-1950's. At the same time Soviet economists of varying persuasions began to debate increasingly openly the causes and potential remedies of the worsening situation. One small group, which has remained in the minority, viewed the problems as essentially technical in nature and advocated the use of cybernetics and computerization of the economy. The majority of the reform-minded economists, however, saw Soviet economic difficulties as rooted in more fundamental factors. In general, these liberal economists agreed that the central authorities are increasingly unable to plan and implement an efficient allocation of resources, especially as the economy grows in size and complexity. They therefore advocated greater decentralization of economic decisionmaking with increased scope for enterprise managers to make operating decisions on the basis of profitability (the ratio of profit to fixed and working capital) and sales indicators instead of the old criterion of gross value of output.

The several currents of economic reform in the early 1960's acquired the shorthand designation in the West of "Libermanism" after one of the chief populizers of these concepts. Several months before he was ousted, Khrushchev sanctioned the trial of these ideas in practice in two textile plants. His successors broadened this experiment, and in September 1965 they unveiled a comprehensive reform of Soviet industry based on these principles. The reform concepts were later extended to construction, transportation, communications, retail trade, and to a limited degree, agriculture.

In theory the reform seeks to energize enterprise management to bring about greater efficiency and motivation by relating success criteria and premia to performance as measured by sales and profits. In practice, however, the regime clearly realizes that the reform, to be truly effective, would entail an unacceptable diminution of the party's control over

the enterprise directors and their staffs. Accordingly, the crucial powers to allocate resources and to designate supplier-user relationships were retained by the central planning authorities from the outset. Some of the main decentralizing features of the reform, moreover, have been eroded over the years by a variety of explicit and implied restrictions that have been placed on enterprise managers. In addition, the reform does not even attempt to deal with such basic flaws of the Soviet economic system such as the artificial and arbitrary character of the pricing mechanism and the lack of sound economic criteria necessary for even a relatively efficient allocation of resources. Finally, the continuing resistance of the economic administrative bureaucracy to the mildly innovative ideas of reform has effectively vitiated these principles as they have been applied to a growing number of economic sectors where they are less applicable (trade, services, etc.), and to progressively weaker enterprises.

In its early phases the reform was relatively efficacious by encouraging a more thrifty use of resources. Managers found it in their interest to reduce the typically large stocks of materials, parts, and labor that were hoarded against the many uncertainties of the Soviet supply system. Once these essentially one-time gains were assimilated, however, the increase in the rate of growth attributable to the reform tended to fall off because its principles do not result in efficient investment allocations or technological progress. To get these types of gains, the regime has resorted to a variety of campaigns and experiments, largely of an exhortatory or administrative nature. Typical examples of the former include the hoary socialist competition campaigns in which enterprises vie to outproduce each other for the publicity and ostensible prestige such extra output brings. The so-called "Lenin Saturdays" is a similar gambit, with workers in participating enterprises contributing an extra day's labor without pay several times a year. During the early 1970's the regime turned increasingly to these and other devices as the benefits derived from the 1965 reform petered out. Symptomatically, Aleksei Stakhanov, the venerable shock miner of the 1930's whose name became synonymous with ideologically inspired high productivity, was brought out of retirement in 1972 to revitalize the campaign approach for greater output.

In the area of administrative initiatives, the Soviets have experimented with a variety of schemes such as the "link" system in agriculture and the Zlobin arrangement in construction; under both innovations, personal responsibility is increased by tying premia more closely to performance than is the general rule in

the U.S.S.R. In industry, the most publicized device in the early 1970's was the Shebekino experiment under which a firm's wage bill stays constant even though the labor force is reduced, with the remaining workers paid more from the wage funds of those let go. There also is a major effort in the current Five Year Plan period centering on "automated systems of management"; some 2,500 of these are to be introduced by 1976, with 1,600 in industry alone. Although the Soviets have never been completely clear as to what they mean by this term, at least initially it connotes the automation of the most routine processes within an enterprise such as payroll, bookkeeping, and the like. According to the most grandiose plans, the Soviets eventually plan to automate coordination inside a single plant, between enterprises, within ministries, and ultimately throughout the economy. As with prior experiments, however, it is unlikely that this gimmick will be any more productive or have a lasting impact than have other experiments in the past.

In April 1973 the Soviets unveiled their most ambitious project in the area of administrative change during the 1971-75 period: the consolidation of the country's 50,000 enterprises into "production associations," or middle level management bodies between the ministries on the one hand and the individual plants on the other. These associations, which are to be formed during 1973-75, will combine enterprises in a given area that are technologically homogeneous or integrally related in terms of the supplier-user relationship. They will also consolidate research and development organizations, which generally do not have the close relationships with producing plants that is characteristically found in advanced industrial societies in the West. The associations will be charged with operational authority over their subordinate enterprises, with the ministries slated to concentrate on the long-range problems and prospects for their specific industries.²

Production associations have existed in the U.S.S.R. since the beginning of the 1960's on a limited, trial basis. As with 1965 reform, the leadership apparently has concluded that the beneficial results of this experience warrant extension of the concept across the country. But application of these ideas in practice is likely to encounter the same type of institutional and operational obstacles on which the 1965 reform foundered. There almost certainly will be strong resistance to the associations by the ministries, enterprises, and local governments, all of which will

²Industries with few enterprises will be combined in a single association while industries with numerous enterprises will be parcelled out among several regional associations.

witness a reduction in their power to the extent that the associations become truly influential in the economic life of the U.S.S.R. The associations, moreover, will be crippled at the outset if they are not given considerable autonomy in such vital matters as setting prices, adjusting production targets, and working out their own supply and distribution systems. As of mid-1973, there was no evidence that the Brezhnev-Kosygin leadership was about to change the U.S.S.R.'s traditional *modus operandi* in these and other, equally crucial economic matters.

3. Manpower (C)

a. Size and composition of the labor force

The Soviet labor force³ (128.1 million persons in 1972) is about 45% larger than that of the United States. The U.S.S.R.'s advantage lies in a larger population and the fact that more than 50% of the Soviet population is in the labor force—a participation rate almost 10 percentage points higher than in the United States. A basic factor accounting for the larger share of employed persons in the U.S.S.R. is the higher incidence of women workers. In 1972, one Soviet worker in two was a woman, whereas the ratio was about one in three in the United States.

Reflecting the course of Soviet economic development, the structure of the labor force has undergone significant changes. The share of the total civilian labor force employed in agriculture dropped from 43% in 1960 to about 30% in 1972 as migration from rural to urban areas continued, although at a depressed rate after 1965. Nevertheless, the proportion of the Soviet labor force now engaged in agriculture is about eight times that in the United States. A comparison of the distribution of employment in the two countries in 1971 is shown in Figure 7.

Important shifts have occurred in the structure of nonagricultural employment as its share of the Soviet labor force has increased. The growth of employment in industry, which outstripped the expansion in other sectors until 1958, slowed during the 1960's. Although only one-fifth of the Soviet labor force is employed in services, compared to one-third in the United States, the Soviet service sector has increased as a proportion of the nonagricultural labor force—from 25% in 1960 to 28% in 1971—as the U.S.S.R. has provided more of the services demanded by an increasingly urbanized population. Commerce, i.e., retail trade, banking, insurance, and the like is increasing its share of total employment in the U.S.S.R., but the actual number of

³Total labor force includes the civilian labor force and the armed forces but excludes militarized security forces.

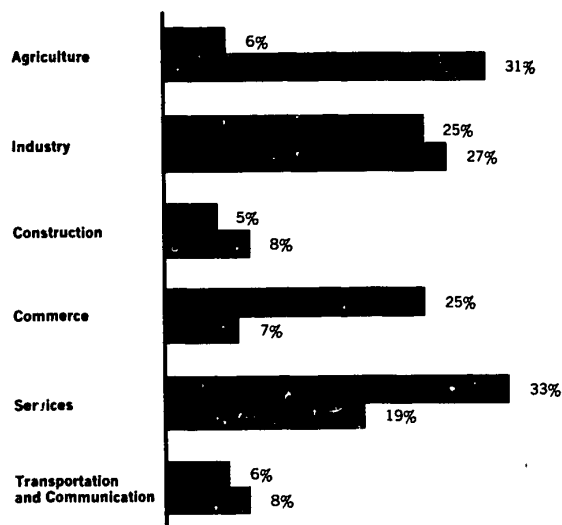


FIGURE 7. Distribution of civilian employment, by sector, U.S. and U.S.S.R., 1971 (U/OU)

people employed in these areas is still small. These activities encompass one-fourth of the U.S. labor force and a mere 7% of the Soviet labor force. Construction takes 5% and 8% of the labor force in the United States and U.S.S.R., respectively, with transportation and communications employing 6% and 8%, respectively.

b. Factors affecting productivity

Labor productivity in the U.S.S.R. and the United States has grown at about the same rate since 1955, as shown in Figure 8. The productivity of labor in Soviet industry was about 40% of U.S. levels in both 1955 and 1970; the comparable figure for agriculture in the U.S.S.R. has remained at about one-tenth of the U.S. level. The marked Soviet advantage over the United States in the rate of growth of industrial output

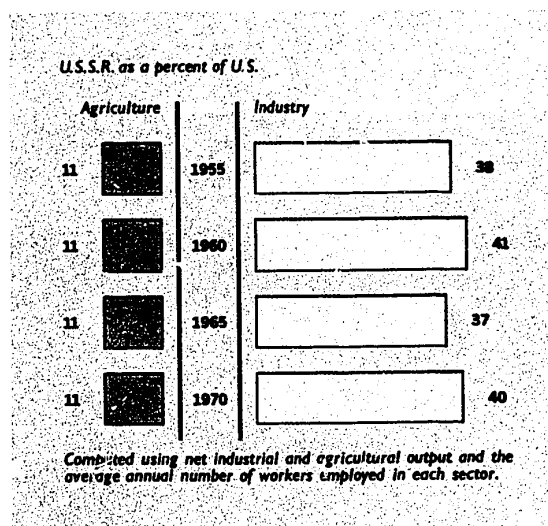


FIGURE 8. Labor productivity (U/OU)

consequently is more a reflection of rapid increases in employment than of productivity. Labor productivity growth, however, has become a critical factor in Soviet economic development due to current labor shortages, which will continue at least until the mid-1970's.

Shortfalls in meeting the goals for productivity growth in the major sectors of the economy have been a persistent problem for the Brezhnev-Kosygin leadership. Until the mid-1960's, deficiencies in labor productivity growth in nonfarm sectors were partially overcome by bringing housewives and young people into the labor force. These sources are no longer available, however.

The crucial role to be played by gains in labor productivity during 1971-75 has been underscored by the below-plan rates of increment actually registered in 1971 and 1972 (Figure 9). According to the goals of the Five-Year Plan for 1971-75, four-fifths of the economic growth during this period is predicated on

FIGURE 9. Changes in labor productivity (C)
(Average annual rate of growth in percent)

| | PLAN 1966-70 | ACTUAL 1966-70 | PLAN 1971-75 | ACTUAL | |
|----------------------|-----------------|-------------------|-----------------|--------|-------|
| | | | | 1971 | 1972 |
| Industry | 5.9-6.2 | *3.9 | 6.8 | *4.6 | *3.8 |
| Agriculture | 7.0-7.7 | *5.8 | 6.6 | *0.9 | *-7.6 |
| Rail transport | 4.2-4.6 | 5.0 | 4.2 | 4.5 | 3.8 |
| Construction | 6.2-7.0 | 4.2 | 6.5 | 5.0 | 5.4 |

*Derived from CIA measures of industrial and agricultural production and estimates of employment made by the Department of Commerce.

greater productivity, and only one-fifth on the employment of additional labor. By way of comparison, approximately one-third of Soviet economic growth in the 1960's was due to an increase in the number of workers, while two-thirds was the result of greater productivity. Labor productivity in industry increased by 4.6% in 1971 and 3.8% in 1972 compared with the average annual rate of 6.8% projected in the Five Year Plan. Agricultural labor productivity gained marginally by 0.9% in 1971 before falling by 7.6% in 1972; an average annual gain of 6.6% has been planned for the 1971-75 period. In view of the difficulty in finding sufficient additional manpower to take up the slack, this overall poor performance in productivity makes achievement of the planned major output targets unlikely.

The regime has applied many forms of incentives and coercion to the Soviet labor force in an effort to achieve scheduled productivity goals, but no single scheme has proved to be a panacea. Efforts to enforce stricter worker discipline have largely failed in the face of a tight labor market because workers have little fear of losing their jobs. Moreover, changes in managerial techniques to spur productivity growth have not yet made a significant contribution to improved efficiency, and such innovations as have been introduced probably will not change matters appreciably.

Real incomes—a prime measure of work incentives—have increased at an average annual rate of 5.4% since 1965, according to official data. This achievement represents an increase in the rate of growth from the 3.5% annual rate recorded during 1961-65, but it is still short of the 6.5% average rate achieved during the 1950's. The rate of improvement in per capita real income since 1965 has experienced sharp yearly fluctuations, but the trend has been downward. Of greater importance to the lower income groups has been the sharp narrowing of wage differentials that has occurred since the mid-1950's, primarily by upgrading wages in the low priority sectors. The minimum wage was raised in several steps from 22 rubles a month in 1950 to 60 rubles a month in 1968. Also, as differentials between blue and white collar workers narrowed, so did those between white collar workers and the most highly skilled workers in the economy; the salaries of the last group stagnated while others enjoyed substantial increases in pay rates.

Associated with the rise in incomes has been a rapid and huge accumulation of personal savings. Deposits of the population in savings banks have grown phenomenally—32-fold since 1950, or at an average annual rate of over 17%. The rate of savings has increased from about 1% of disposable income to

nearly 4% since 1960, but it remains roughly half the rate of personal savings in the United States. This enormous growth in savings, caused in part by the U.S.S.R.'s inability to supply its people with acceptable consumer goods and services, has both weakened the incentive effect of increased wages and added to the pressures of suppressed inflation. To prevent any further increases in such pressures, the regime planned to break wage increases in 1973, as follows, in percent:

| | ACTUAL 1971 | ACTUAL 1972 | PLAN 1973 |
|------------------------|----------------|----------------|--------------|
| State employees | 3.2 | 3.5 | 2.7 |
| Collective farms | 3.0 | 4.7 | 4.4 |

If successful, the leadership's incomes policy would hold the growth in total incomes to about 5% in 1973. Coupled with the brighter outlook for the consumer sector, this could partially restore the incentive effect of wage increases.

4. Finance (U/OU)

The essential function of Soviet financial institutions is to direct the distribution and use of resources in accordance with the economic plan. The banking system is a powerful instrument for influencing the operations of the enterprises because it handles virtually all transactions between enterprises, provides short-term credit for working capital, and acts as agent of the state in disbursing allocations for capital investment. Records of financial flows, moreover, enable the financial institutions to act as a vast inspection and control organization, policing the enterprises' use of resources to assure compliance with plan directives. The principal financial institutions, in addition to the Ministry of Finance, are the State Bank, the Construction Bank, the Foreign Trade Bank, the savings banks, and the Main Administration of State Insurance.

The State Bank acts as a part of the central bureaucracy in implementing the directives of the economic plan by providing funds to the enterprises to bring about the desired use of resources. It also performs limited central banking functions, issuing currency, providing clearing and transfer facilities, and acting as fiscal agent for the various levels of government. As the source of virtually all short-term credit, the State Bank is directly engaged in controlling the flow of economic activity. In addition, the State Bank exercises "control by the ruble," i.e., supervising the activities of enterprises with respect to plan fulfillment and enforcing the application of economic accounting procedures. An important feature of this control is the legal requirement that

enterprises maintain with the State Bank a "settlement account" (the accounts of construction organizations are maintained with the Construction Bank), and that all inter-enterprise payments above a certain minimum be affected by transfers between these accounts. Every order for such a transfer must be accompanied by full documentation of the transaction covered with the result that the State Bank is able to audit continuously the current operations of each enterprise. Capital funds are supervised closely by the Construction Bank, which distributes budgetary investment grants (except in rural areas) and extends long-term credit for investment.

The state budget is an important financial instrument for implementing the regime's key economic policies. Most of the budget revenues are derived by setting the prices of the majority of goods at levels higher than costs of production and by appropriating the difference. Some of the difference between prices and costs is accounted for by the turnover tax—essentially a differentiated sales tax on consumer goods—which is constructed to provide about one-third of total receipts in the state budget for 1973 (fiscal year=calendar year) (Figure 10). The turnover tax on the average comes to over 30 percent of the value of retail sales. The remainder of the difference between prices and costs consists of enterprise profits, the bulk of which are transferred to the budget; the percentage of profits remaining with the enterprise, however, has increased under the 1965 reform.

Of total planned expenditures in 1973, 48% was allocated to finance industry, construction, agriculture, transportation and communications, trade, and other activities under the budget category "financing the national economy." This category of expenditures provides funds for the bulk of the fixed capital investment and covers subsidies to enterprises suffering losses, grants to finance planned increases in the inventories and cash balances of enterprises, additions to state material reserves and other expenditures, including price subsidies on agricultural procurements. Subsidies on agricultural procurement constitute the major item in the "other" section of the "financing the national economy" category.

Expenditures for social and cultural purposes (including education and science, health, and social welfare) represent the second largest outlay in the state budget, accounting for 37% of total planned expenditures in 1973.

The allocation for defense in the 1973 budget of 17.9 billion rubles accounted for almost 10% of total planned expenditures; this figure, however, is not a reliable indicator of total military spending. In addition to the explicit defense entry, other categories

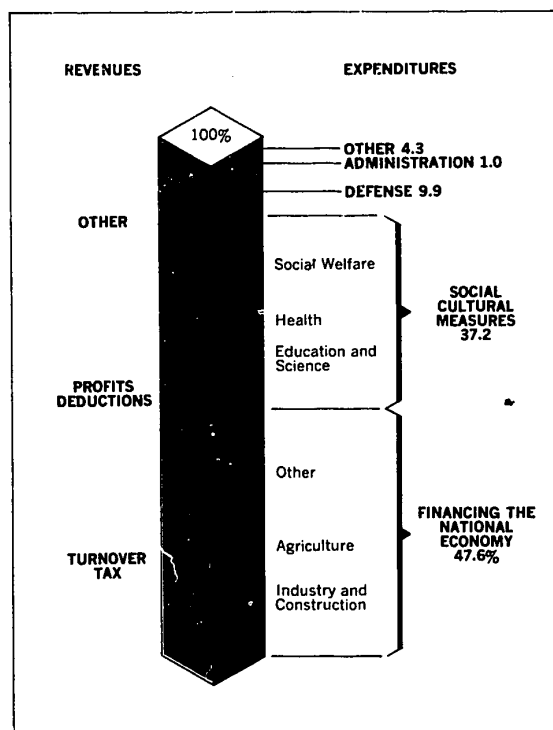


FIGURE 10. Principal components of state budget revenues and expenditures, 1973 plan (U/OU)

of the budget appear to be devoted to defense-associated programs such as civil defense, internal security forces, and foreign military aid. The space program as well as military research and development appears to be funded primarily from the science category of the budget. The size of the 1973 state budget and its major components are shown in the following tabulation (in billions of rubles):

| | BILLION RUBLES |
|---|-------------------|
| Revenues | 181.9 |
| Turnover tax | 57.9 |
| Profits deductions | 64.2 |
| Other | 59.7 |
| Expenditures | 181.6 |
| Financing the national economy | 86.5 |
| Agriculture | 15.0 |
| Transportation and communications | 3.2 |
| Trade, municipal services, housing, and other outlays | 34.4 |
| Social and cultural measures | 67.5 |
| Education and science | 29.9 |
| Health | 10.2 |
| Defense | 17.9 |
| Administration | 1.8 |
| Other | 7.9 |
| Surplus (rounded to one decimal fraction) | 0.2 |

5. Development

a. Planning (U/OU)

All totalitarian (as opposed to simply dictatorial) societies by definition have planned economies to some degree, but none has carried this to the extent as has the U.S.S.R. Occasionally the Soviets have devised long-range programs encompassing 10, 15, or 20 years, but these are essentially only blueprints outlining the general direction of the economy's development intended by the leadership at the time. At present the U.S.S.R. ostensibly is operating under such a program for 1961-80. As this projection was formulated by Khrushchev, it is unlikely to have any meaningful content now, although it has not been repealed by his successors. The present regime, moreover, has authorized the drafting of a development plan covering the period 1976-90.

More characteristic have been the Five Year Plans, which set broad goals for overall economic progress as well as for the various sectors of the economy. Within this time period the Soviets compile annual plans each of which is the operational guide to that year's economic decisionmaking. This plan sets forth in great detail the annual goals for production and distribution, both in physical units and in monetary terms. Subelements of the annual plan are the quarterly and monthly plans, with the latter taking into account the actual number of days to be worked in any given month.

In addition to projecting output and distribution, the annual economic plan also covers employment, costs, expenditures for investment and defense, foreign and domestic trade, and income distribution. A supplementary technical plan elaborates specific inputs of materials and capital, and a financial plan indicates the sources and methods of funding the country's projected activities. The national plan is not limited to the aggregate national level, but also contains a breakdown by major territorial subdivisions and by institutions (such as the ministries); it also contains provisions for smaller units down to and including the individual enterprise.

The operations of state enterprises are planned in considerable detail. Enterprise management participates in the planning process, but the basic features of the plan are determined by the hierarchy of planning and supervisory organizations that culminates in the Politburo. Under the reform, the enterprise is given targets in its plan for the total value of its sales, for total profit, for profit expressed as a percentage return on its capital, and for the production of each of its "basic" products. These last

goals are to be met in any event and exceeded if possible. The total output of "basic" products specified in the plan usually does not exhaust the productive capacity of the enterprise, however, and enterprise management can exercise considerable discretion concerning above-plan activities.

The plan for an enterprise specifies customers for most of its production and sources for the bulk of its material requirements. Most prices, including wage rates, are fixed centrally, and a number of other matters are decided for the enterprise by higher authorities. Thus, the freedom of action of enterprise managers is substantially circumscribed by the plan. However, gaps in the plan, inconsistencies among plan directives, and incomplete state control over the plan's execution have the effect of increasing the freedom of action of enterprise managers beyond that contemplated by the planners. Ironically, it is these shortcomings from the planners' ideals that often permit enterprise managers to engage in illegal or officially reprehensible actions that make possible fulfillment of the plan.

b. The 1971-75 plan (C)

The Ninth Five-Year Plan covering the period 1971-75 marks the first time since World War II that the Soviets have published a significant amount of detail about a 5-year plan. Throughout 1971 and early 1972, a stream of press and journal articles described various aspects of this plan. In April 1972 the State Planning Commission released a monograph elaborating in considerable detail the goals of the plan which had previously been outlined in general terms at the 24th Party Congress in March-April 1971 and confirmed at a Supreme Soviet meeting in November of that year.

As originally formulated, the economic blueprint of the new 5-year plan did not call for a radical shift either in production or allocational policies. The average annual rate of increase planned for GNP was slightly above the average annual rates of growth actually achieved during 1966-70, and considerably higher than the increments registered in 1961-65, as shown in the following tabulation, in percent:

| | ACTUAL 1961-65 | ACTUAL 1966-70 | PLANNED 1971-75 |
|-------------------------------|-------------------|-------------------|--------------------|
| Total output (GNP) | 5.0 | 5.6 | 5.8 |
| Industrial output | 6.8 | 6.4 | 8.0 |
| Agricultural output | 2.8 | 4.7 | 3.7 |

The average annual projections for industry during 1971-75, however, were appreciably above those registered during the previous decade, while the comparable figures for agriculture represented a cutback from the rates of growth achieved in 1966-70.

Although the plan directives verbally place unusual emphasis on improving the lot of the Soviet consumer, the specific figures cited imply that the rate of progress planned for raising the standard of living is somewhat lower than that achieved during 1966-70. Nevertheless, there are signs that consumption and consumer-related sectors such as agriculture now may be on a more equal footing with other claimants. This seems to mean that if the economy fails to grow at expected rates, the consumer-oriented sectors probably will suffer no more than the growth-oriented industries. If this occurs, it will mark a major turning point in Soviet economic policy, which has traditionally favored investment in the growth-oriented sectors.

If achieved, the targeted average annual rate of increase in per capita consumption of 4% should meet the population's expectation of steady and visible progress in this area. There is little prospect, however, of a significant reduction in the chronic irritations to consumers of shortages and queues, distorted prices, poor quality, and neglect of consumer preferences. These are matters that the Soviet system has failed to solve despite the growing availability of resources for the consumer. From his point of view, probably the most important element in the consumer welfare picture is the rate of improvement in the Soviet diet. Progress in agriculture naturally is the key to meeting this demand for higher quality food. (See Subsection C, 1, d for further discussion of this subject.)

At first glance, the agricultural goals for 1971-75 appear only moderately ambitious in as much as the average annual rate of growth is projected to increase by less than the rate of expansion recorded in the 1966-70 period. The growth rate recorded in the earlier period, however, was based on a very unfavorable weather year (1965) and ended in a generally favorable year (1970), whereas the current goal begins on the high plateau of 1970. Incomplete evidence pertaining to resource allocation plans, moreover, indicates an increase in the growth of annual inputs to the farms during 1971-75. Indeed, if Brezhnev's rhetoric has content, the ambitious plans for investment and industrial support to agriculture will be carried out with unprecedented persistence. There are also signs that the regime is now more tolerant of private farming activity on the small, family-held plots which contribute significantly to the supply of certain fruits and vegetables.

Although the 1971-75 plan for foreign trade indicate a slowing of the rate of growth of total trade

turnover, the Soviets will continue to use foreign trade to alleviate some of the strains in their economy, especially through imports of capital goods from the industrial West. As before, the principal constraint to expanded trade will be the USSR's growing indebtedness to Western trading partners and the problem of generating a rising volume of exports acceptable in hard currency areas.

Following traditional Soviet emphasis, the goals for industry are the centerpiece of the Ninth Five Year Plan. The 1971-75 goals for the major sectors of industry imply an acceleration in the rate of growth of industrial production as a whole as well as in machinery and certain other branches—forest products, paper and pulp products, coal, and processed foods. The picture is somewhat different, however, in most branches producing fuels, industrial materials, and in light industry. The growth of electric power production, which declined considerably in the latter half of the 1960's, is planned to grow at the same rate as during 1966-70. Petroleum products and gas are scheduled to follow this same trend, while the planned growth of ferrous metals will be somewhat lower than the rates achieved during 1961-65 and 1966-70. The planned growth rates of construction materials and chemicals are well above the 1966-70 rates and represent almost a complete return to the high rates of growth recorded in 1961-65. The planned growth of the food industry is not as high as the growth in 1961-65, but it is nevertheless much higher than the rate achieved in 1966-70. Planned rates of growth in 1971-75 are as follows, compared with rates actually attained in the 1960's:

| | ACTUAL 1961-65 | ACTUAL 1966-70 | PLANNED 1971-75 |
|-------------------------------------|-------------------|-------------------|--------------------|
| Industrial materials | 7.1 | 6.0 | 7.0 |
| Electric power | 11.5 | 7.9 | 7.9 |
| Coal products | 2.8 | 2.0 | 3.0 |
| Petroleum products and gas | 9.9 | 7.8 | 7.9 |
| Ferrous metals | 7.9 | 5.5 | 5.1 |
| Nonferrous metals | 8.3 | 8.6 | 8.4 |
| Forest products | 3.0 | 3.5 | 5.8 |
| Paper and pulp products | 7.7 | 7.2 | 8.5 |
| Construction materials | 7.2 | 6.1 | 7.1 |
| Chemicals | 12.1 | 9.9 | 11.5 |
| Machinery | 7.8 | 7.1 | 11.4 |
| Light industry | 2.4 | 8.0 | 6.6 |
| Food industry | 7.0 | 4.7 | 6.2 |
| Total industrial output | 6.8 | 6.5 | 8.0 |

Almost without exception, the planned average rates of growth for the industrial branches as well as for key industrial commodities are highest in the last 2 years of

the plan. This pattern stands out particularly in the annual plans for major industrial materials, as shown below, in percent:

| | 1971 | 1972 | 1973 | 1974 | 1975 |
|--|------|------|------|------|------|
| Crude steel | 3.5 | 4.7 | 4.3 | 5.5 | 6.0 |
| Coal | -0.6 | 2.2 | 2.8 | 2.9 | 3.7 |
| Petroleum | 6.5 | 6.4 | 5.6 | 7.5 | 7.6 |
| Natural gas | 6.6 | 8.5 | 9.2 | 12.0 | 14.3 |
| Electric power | 6.6 | 7.6 | 7.4 | 7.9 | 8.1 |
| Chemicals and pet- ro-chemicals | 8.1 | 10.5 | 10.7 | 13.6 | 14.5 |
| Cement | 5.0 | 4.4 | 4.9 | 7.2 | 7.5 |
| Paper | 4.9 | 4.5 | 6.6 | 6.6 | 7.5 |

The abrupt acceleration in production planned in 1974-75 probably is tied to the expected completion of major investment projects. The leadership is taking a major risk in scheduling most of the acceleration in the latter part of the plan period because the Soviet record in completing investment projects on time is notoriously bad.

The most doubtful aspect of the overall industrial plan is that the planned acceleration in production is to be supported in large part by substantial planned increases in productivity. This is because the planners have been forced to project a smaller increase in industrial employment and a slower rate of growth of fixed capital stock in industry than in the past. In 1966-70, for example, industrial employment increased by 2.9% annually; the planned rate of growth during 1971-75 is less than half this figure, or 1.3% per year.

Shortfalls in attaining productivity goals in the past were partially offset by higher-than-planned increments to industrial employment, achieved mainly by increasing the labor participation rate and by drawing labor into industry from other sectors of the economy, especially from agriculture. In the 1971-75 plan period, a demographically determined slower rate of increase in the labor force necessarily limits the options open to the planners. The population of working age during the plan period is known, and the chances of increasing the participation rate are slim. At the same time, the emphasis placed on agriculture, especially on the livestock sector, has reduced and will continue to limit the flow of labor from the countryside; in addition, the planners hope to funnel more workers into the service sector.

The growth of new plant and equipment in industry is not scheduled to accelerate during 1971-75. Although new fixed investment in industry is planned to grow somewhat faster in 1971-75 (8.6%) than

during 1966-70 (7.8%), this investment will support a planned growth of industrial fixed capital stock somewhat less than that achieved in 1966-70—8.4% per year in 1971-75 compared with 8.7% during 1966-70. As a result of these several trends, the implied growth of combined factor productivity in 1971-75 of 3.7% annually appears unrealistic in light of the extremely low growth rates achieved during the 1960's; virtually all of the retardation in the rates of growth of industrial output in the 1960's can be traced to an abrupt slowdown in the increase in productivity of inputs of labor and capital.

If the productivity plans for 1971-75 are not met, the leadership either will have to draw additional labor from other sectors, notably services, or accept lower rates of growth of output. Substitution of capital for labor will not be a viable alternative. The planned growth of capital stock was underfulfilled in 1966-70, and fixed capital in industry is unlikely to grow more rapidly than planned in 1971-75. Despite the professed intent of the leadership to stress the service sector in 1971-75, the Soviets probably will not permit serious shortfalls in industrial production in order to maintain the plans for services; indeed, the small increments of labor currently planned for the service sector are explicitly related to gains in productivity in this sector.

During the first 2 years of the 1971-75 plan, the growth of industrial output faltered, agriculture production suffered a severe setback and GNP grew by only 2.7% per year compared with the average annual rate of increase of almost 6% planned during 1971-75. Net industrial production increased by about 6% in 1971 and by about 5% in 1972, the smallest annual increases since World War II. This industrial slump was the result of factors which have been at work for some time as well as the effects of the decline in agricultural production in 1972. As in the past, overly ambitious productivity goals were not met, targets for economizing on raw materials fell short of plans, and new plant and equipment was not brought on stream as scheduled. The agricultural situation affected industry by reducing the flow of raw materials and by diverting resources—especially labor and trucks—away from industry.

The magnitude of the 1972 shortfalls forced Soviet planners to abandon many of the detailed targets for 1973 that had been set out in the original Five Year Plan directives. In particular, the planners made major adjustments in the goals for industry, agriculture, investment, and consumer welfare. The revised plan

goals nevertheless imply a growth of GNP of 7.1% for 1973 or well above the 5.8% average annual rate of growth planned for the 5-year period, 1971-75. The plan for GNP in 1973 depends mainly on a projected 12.6% increase in farm output, but some recovery also is planned in the growth of industrial production and freight transportation.

In industry, production targets for the oil and gas, chemicals, and some machinery products have been scaled down because production capacity has not grown as rapidly as planned. The degree of adjustment can be seen in the following comparison of the goals for growth in industrial output in 1973 as given in the Five Year Plan directives and in the report of the Chairman of the State Planning Commission in December 1972:

| BRANCH OF INDUSTRY | ORIGINAL PLAN | REVISED PLAN |
|-----------------------|------------------|-----------------|
| All industry | 7.8 | 5.8 |
| Oil | 8.7 | 7.5 |
| Gas | 9.2 | 7.7 |
| Chemicals | 10.7 | 8.5 |
| Machinery | 11.4 | 10.4 |
| Soft goods | 6.7 | 4.0 |
| Processed foods | 7.7 | 2.0 |

The significantly lower goals for production of soft goods and processed foods reflect both the delays in getting new capacity into production and anticipated shortages of raw materials to produce processed meat, vegetable oil, sugar, wool, and linen.

Although growth of consumer-oriented output in 1973 was cut back sharply from earlier plans, there was no evidence of a basic shift in overall priorities.

These priorities, as reflected especially in the 1971-75 investment plan, gave great weight to agriculture and put other consumer interests on a more equal footing with heavy industry. Indeed, the 1973 goals for investment could best be characterized as a last-ditch attempt to save the major goals of the 1971-75 plan.

Preliminary figures show Soviet economic growth turned upward in 1973 as farm output bounced back from the depressed level registered in 1972. Preliminary indications are that GNP in 1973 grew at almost 7%, compared with a planned growth of 7.1%. Industrial performance improved somewhat in 1973, registering a growth rate of almost 6% compared with 5% in 1972, due largely to the elimination of shortages of agricultural raw materials. The industrial investment program appears to be going well, but it is as yet too early to assess the full impact of these developments. Unless the weather is unusually poor, GNP is likely to grow by perhaps 5% to 6% per year during 1973-75. This would mean that the average annual rate of growth in the first half of the 1970's would be significantly less than the rate in 1966-70; in other words, the Ninth Five Year Plan probably will be underfulfilled by a considerable margin. As a result, many of the agricultural and consumer-oriented targets as well as some important industrial goals of the plan will have to be abandoned well before 1975. Figure 11 shows by selected indicators that average annual increments required during 1973-75 are still high compared with performance in 1971-72 despite substantial reductions in the 1973 plan from its original projections.

FIGURE 11. Selected indicators of the ninth five year plan, 1971-75 (U/OU)
(Annual percentage increases)

| | 1971 ACTUAL | 1972 ACTUAL | 1973 PLAN | | AVERAGE ANNUAL INCREASE NEEDED IN 1973-75 TO MEET 1975 GOAL* |
|--|----------------|----------------|-----------|---------|---|
| | | | Original | Revised | |
| National income (Soviet definition)**..... | 6.0 | 4.0 | 7.2 | 6.0 | 8.1 |
| Gross industrial output..... | 7.7 | 6.5 | 7.8 | 5.8 | 8.6 |
| Producers' goods..... | 7.7 | 6.8 | 7.6 | 6.8 | 8.3 |
| Consumers' goods..... | 7.7 | 6.0 | 8.1 | 4.5 | 9.4 |
| Total investment..... | 7.8 | 6.6 | ***7.6 | †2.8 | 6.8 |
| Retail trade turnover..... | 6.7 | 6.9 | 7.6 | 5.2 | 7.4 |
| Average money earnings of wage and salary workers... | 8.2 | 8.5 | 4.5 | 2.7 | 4.6 |
| Income of collective farmers††..... | 8.0 | 4.7 | 6.6 | 4.4 | 6.6 |
| Real income per capita..... | 4.5 | 8.7 | 5.7 | 4.5 | 6.5 |

*Calculated from actual figures for 1971-72 and the overall targets for 1971-75.

**Soviet definition of national income excludes services.

***Calculated from the actual 1972 figure and the original 1973 target.

†Calculated from the actual 1972 figure and the new, reduced 1973 target.

††Both cash and in kind; excluding income from the sale of produce raised on private plots.

C. Structure of the economy

1. Agriculture, fisheries, and forestry (U/OU)

a. Problems and Policies in Agriculture

Agriculture is the most serious, abiding, and intractable problem area of the Soviet economy. Even in years of bumper harvests Soviet farms have not produced as much food as desired or in the variety and quality demanded by the consumer. In particular, only a fraction of the demand for meat, fruit, and most vegetables has been met, forcing the Soviet diet to be heavily weighted with bread products and carbohydrates, such as potatoes. Production has fluctuated widely, moreover, with serious shortfalls often following good harvests. Most of the leading agricultural areas are handicapped by short growing seasons, low rainfall, and extremes of temperature. In addition, the regime's insistence on controlling and directing farm operations from above, and its failure to provide both adequate incentives and sufficient supplies adversely affect the productivity of the nation's farmers.

Developments in agriculture under Khrushchev illustrate how swings in policy together with sharp variations in weather created an unstable situation in food production. During 1953-58 the regime accorded substantially higher priority to agriculture, resulting in increased allocations of machinery to the farms as well as numerous incentive measures, such as a sharp rise in real income, to induce Soviet farmers to work longer and harder. Khrushchev's campaign to develop virgin and long-fallowed lands also contributed to an almost 50% increase in farm output. After 1958, however, the failure to sustain these policies led to a drastic slowdown in the growth of farm output. Farm production and incomes stagnated during the early 1960's, and Khrushchev's plans for expanding sown acreage were not attained. Continuous cropping in the new lands resulted in the deterioration of the soil structure, severe infestations of weeds, erosion, and a depletion of soil moisture reserves. When combined with extensive droughts in 1963 and 1965, these policies led to a decline in the grain harvest, and 11 million tons of grain had to be imported to maintain food supplies at a barely adequate level.

In March 1965 the Brezhnev-Kosygin leadership unveiled a far-reaching program for accelerating the growth of agricultural output and for reducing the annual fluctuations in yields. The program for 1966-70 included a doubling of investment in agriculture compared with the period 1961-65, higher prices to producers for major agricultural products, and lower

prices for nonagricultural goods sold to the farms. The new regime also proposed a reduction in the party's interference in farming operations. Generally successful implementation of these policies and an extended period of favorable weather led to an increase of more than one-fifth in agricultural output during 1966-68 compared with farm production during the last 3 years of Khrushchev's regime, 1962-64. As with Khrushchev, however, the early success of the Brezhnev program led to a considerable weakening of the farm sector's priority in subsequent years. The rapid increase planned in the supply of industrial products to agriculture did not occur. The original plan for deliveries of investment goods (tractors, trucks, and other agricultural machinery) and industrially produced materials (fertilizers, lubricants, electricity, and the like) was cut back in 1967-69, but even these reduced plans were not met with the exception of fertilizer. In 1970, the last year of the first Brezhnev program, nonagricultural inputs rose by almost 2.5%, or as much as the total increase achieved during 1967-69. This growth in the resource base in 1970, coupled with generally favorable weather, boosted net farm output to a record level.

Despite the shortfall in deliveries of tractors and other agricultural machinery to the farms during 1966-70, the U.S.S.R. has achieved a fairly high level of mechanization in such basic field operations as the plowing, seeding, cultivation, and harvesting of grain crops. Raising the level of mechanization in other operations, particularly in the livestock sector, has received special emphasis in recent years, but progress has been slow. Deliveries of new equipment have been sufficient to continue the buildup of inventories of a number of major items, although the rate was lower in the early 1970's than a decade earlier. For certain other categories, inventories have declined because of insufficient output or production delays as new models were introduced. Inventories in selected years of the more important agricultural machines are as follows (in thousands of units as of 1 January):

| | 1961 | 1966 | 1972 |
|-------------------------------|-------|-------|-------|
| Tractors | 1,122 | 1,513 | 2,046 |
| Trucks | 778 | 962 | 1,243 |
| Grain combines | 497 | 520 | 639 |
| Ensilage combines | 121 | 205 | 149 |
| Beet combines | 34 | 68 | 56 |
| Potato combines | 10 | 24 | 40 |
| Cotton pickers | 11 | 34 | 40 |
| Windrowers | 281 | 401 | 327 |
| Tractor plows | 782 | 960 | 942 |
| Tractor drills | 1,049 | 1,274 | 1,218 |
| Grain cleaning machines | 95 | 129 | 156 |

A major factor contributing to the inefficient utilization of equipment and the consequent high costs of production in Soviet agriculture is the poor state of maintenance and repair work. Moreover, spare parts are in short supply, highly priced, and often of poor quality. During 1966-70 the production of spare parts for tractors and agricultural machinery was only about 80% of officially estimated requirements; improvement in the supply of parts in 1971-72 was marginal at best.

Deliveries of fertilizer to agriculture were scheduled to reach 55 million tons in 1970, more than double the quantity supplied in 1965, but they amounted to only 46 million tons because the introduction of new fertilizer manufacturing capacity during 1966-70 was substantially behind schedule. The plan for 1971-75 calls for an increase of 40 million tons in fertilizer production capacity; if the target for 1973 is met, almost half of this goal will have been achieved.

Even before the results of the 1970 harvest were known it was clear that the regime was concerned over the situation in the agricultural sector. The Second Five Year program for improving Soviet agriculture was first spelled out at a party plenum in July 1970, almost a year before the balance of the overall economic plan for 1971-75 was announced. Despite the concern over food supplies, however, the agricultural output targets for 1971-75 appear only moderately ambitious. Net agricultural output is slated to increase by 3.7% annually compared with average annual increments of about 4.5% registered during 1966-70.

The plan for additions to farm resources calls for an estimated increase of 10% between 1970 and 1975, with a marked emphasis on industrially produced items. As a result, the capacity in selected branches of industry is to be expanded to provide the flow of producer durables, construction materials, agricultural chemicals, and other products necessary to support higher levels of direct investment in agriculture. The highlights of the new program are as follows:

(1) Investment in agriculture is scheduled to grow an average of 9.5% a year and to rise as a share of total investment from 23.5% in 1970 to 27.5% in 1975.

(2) Total investment in farm machinery and equipment is projected to increase 54% over the value of such deliveries in the last half of the 1960's.

(3) About one-fifth of total investment in agriculture is to be expended on land amelioration, largely for reclamation by irrigation and drainage. This will expand the stock of irrigated and drained land by about 30%.

(4) Industrial items used in farm production are planned to rise at an average annual rate of 6.5% during 1971-75.

Although certain aspects of the program were slightly behind schedule as of mid-1973, important steps were taken in 1971 and 1972 to implement the 1971-75 plan. Total inputs increased at an average annual rate of about 2%, or slightly above the growth required to meet the 1975 goal. Hence, despite the surge in output in 1970—agricultural production rose 13.5% over 1969—followed by another record output in 1971, the regime has remained firm in its resource commitment to the agricultural sector.

Farm output in 1972 declined by about 7% from the high level of 1971, largely as a result of unfavorable weather conditions. The difference in the regime's response to harvest disasters in 1963 and 1972 graphically illustrates a fundamental shift in the leadership's agricultural policy. In the earlier year, Khrushchev minimized his foreign commitment, choosing instead to allow consumers to suffer and livestock herds to be reduced sharply. In 1972 the Brezhnev-Kosygin regime chose to spend vast sums on foreign grain (28 million tons in the period 1972-first half 1973) in a successful effort to save herds and maintain food supplies. Moreover, continued adherence by the leadership to developing the livestock sector means that the U.S.S.R. probably will become a net importer of feed grains in the years ahead.

b. Main characteristics of Soviet agriculture

(1) *Land use*—The U.S.S.R. is the largest country in the world with a total land area of 8.6 million square miles. About one-half of Europe and one-third of Asia lie within Soviet boundaries. Of the total land area, however, only about 11% is suitable for cropping (see the Land Use inset on the Summary Map at the end of this chapter). Another 16% can be used only for meadows and pastures because of poor soil or low precipitation. More than two-thirds of the U.S.S.R. is comprised of forests, deserts, and wasteland. Much of the latter is suitable for limited grazing of livestock, ranging from raising reindeer in the north to nomadic herding of sheep and goats in the arid regions of the south.

(2) *Resource base*—The U.S.S.R. has more than twice the land area of the United States, but its arable is only a third larger. The Soviet Union, moreover, has no areas that correspond to the most productive farm regions in the United States, which until recently had been reducing the area under cultivation. In 1971 the sown area in the U.S.S.R. amounted to 512 million acres compared with the 301 million acres in the United States.

Harsh climatic conditions impose severe restrictions on Soviet agriculture. The basic environmental problems are low temperatures and excess soil moisture in the north combined with unusual heat and aridity in the south. The short growing season and the extremes of temperature limit the types of crops that can be grown even in the critical "fertile triangle" of Soviet agriculture extending from the Ukraine eastward nearly to Irkutsk.

(3) *Farm organization*—Soviet agriculture is divided into a socialized sector, which predominates, and a private sector. The former, consisting primarily of state and collective farms, accounts for roughly two-thirds of the total agricultural output. The private sector consists of about 30 million small, private plots, one of the last legal remnants of private enterprise in the U.S.S.R. As all land is owned by the state, the basic difference between these two types of organization lies in the ownership of assets other than land, in the method of capital formation, in the payment for labor, and in the system of marketing agricultural produce.

Between 1958 and 1971 the number of state farms increased from 6,002 to 15,502, and the number of collective farms declined by more than half—from 67,700 to 32,300—partly through the amalgamation of smaller collective farms and partly through conversion to state farms. As the following tabulation shows, by 1971 state farms and other state-owned agricultural enterprises accounted for half of the total sown area in the U.S.S.R.:

| | 1958 | | 1971 | |
|--|---------------|------------------|---------------|------------------|
| | MILLION ACRES | PERCENT OF TOTAL | MILLION ACRES | PERCENT OF TOTAL |
| Socialized sector | 465.3 | 96.3 | 495.7 | 96.8 |
| State agriculture | 140.6 | 29.1 | 256.4 | 50.1 |
| State farms | 129.6 | 26.8 | 233.3 | 45.6 |
| Other state agricultural organizations | 11.0 | 2.3 | 23.1 | 4.5 |
| Collective farms | 324.7 | 67.2 | 239.3 | 46.8 |
| Private | 18.1 | 3.7 | 16.5 | 3.2 |
| Total | 483.4 | 100.0 | 512.2 | 100.0 |

Small-scale private farming on plots averaging little more than an acre in size has been tolerated by the regime for pragmatic reasons despite the ideological contradiction inherent in this capitalistic activity. In 1971, private farming supplied 63% of the potatoes, half of the eggs, 37% of the vegetables, and 35% of the milk and meat produced. The private plots, however, tend to compete with the socialized sector for feed supplies and for the labor of the farmers; consequently, there have been periodic attempts by

the state to decrease the importance of the private sector through discriminatory taxes and reduction in the size of plots and the number of animals permitted. Nevertheless, the fact remains that almost 30% of total agricultural output originates in the private sector, which directly holds only slightly more than 3% of the total sown area. The private sector, however, has access to some land controlled by the socialized sector and uses it for pasturing privately owned livestock and growing hay. If the area in the socialized sector that directly or indirectly produces feedstuffs for the private sector is added to the relatively small amount of land directly held by households, the land area supporting private farming equals roughly one-fifth of the country's total arable land.

(4) *Crops*—The U.S.S.R. grows most crops common to the temperate zone, but grains dominate the pattern, accounting for 57% of the total sown area in 1971. In the same year forage crops accounted for 31% of the total, industrial crops 7%, and potatoes and other vegetables 5% (Figure 12). The total crop area has expanded significantly since 1950, with most of this growth attributable to the New Lands program, largely in Kazakhstan. In 1950-63 a drastic reduction of clean fallowing from 79.1 million acres to 15.6 million acres aided this expansion. By 1968 the area in clean fallow had increased to its present level of 45.0 million acres, although it declined again to 40.0 million acres in 1972. As a result, the regime has been unable to raise this figure to a planned amount of about 50 million acres because of the country's continuing critical need for grain. (In clean fallowing, the land is not planted and is cultivated only as needed to prevent the growth of weeds; this permits moisture and nutrient accumulation in the soil to raise crop yields in the following year.)

The distribution of area sown to major grain crops (including pulses) for 1953 and 1972 is shown in the following tabulation as percentages of the total:

| | 1953 | 1972* |
|---------------------------|-------|-------|
| Bread grains: | | |
| Wheat | 45.3 | 48.7 |
| Rye | 19.0 | 6.8 |
| Total | 64.3 | 55.5 |
| Other grains: | | |
| Barley | 9.0 | 22.7 |
| Corn | 3.3 | 3.3 |
| Miscellaneous** | 23.4 | 18.5 |
| Total | 35.7 | 44.5 |
| Total grains | 100.0 | 100.0 |

*Preliminary estimates.

**Primarily pulses (beans, peas, lentils), oats, millet, buckwheat, and rice.

FIGURE 12. Sown area, by crop (U/OU)
(Million acre.)

| | 1950 | | 1955 | | 1960 | | 1965 | | 1971 | |
|------------------------------------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| | Total area | Per-cent* | Total area | Per-cent* | Total area | Per-cent* | Total area | Per-cent* | Total area | Per-cent* |
| Grain (including pulses)..... | 254.2 | 70.3 | 305.0 | 66.4 | 285.5 | 57.0 | 316.4 | 61.2 | 291.4 | 56.9 |
| Industrial crops**..... | 30.2 | 8.4 | 30.4 | 6.6 | 32.3 | 6.4 | 37.9 | 7.3 | 35.2 | 6.9 |
| Potatoes and other vegetables..... | 25.8 | 7.1 | 28.3 | 6.2 | 27.7 | 5.5 | 26.1 | 5.1 | 24.5 | 4.8 |
| Forage crops***..... | 51.3 | 14.2 | 95.5 | 20.8 | 156.1 | 31.1 | 136.3 | 26.4 | 161.1 | 31.4 |
| Total..... | 361.5 | 100.0 | 459.2 | 100.0 | 501.6 | 100.0 | 516.7 | 100.0 | 512.2 | 100.0 |

*Based on unrounded data.

**Includes food crops (primarily sugar beets and sunflower seed) and nonfood crops (primarily cotton, fiber flax, and hemp).

***Cultivated annual and perennial crops supplying hay, silage, pasture, and other feeds of a similar nutrient content.

Although the area sown to grain in the Soviet Union is greater than in the United States, total production is much lower in the U.S.S.R. (Figure 13). Soviet grain production, moreover, is subject to marked fluctuations. The 1958 level of output was not matched until 1964 and not surpassed until 1966; in 1963 and 1965 severe droughts resulted in nearly disastrous harvests. The bumper grain harvest in 1968, however, ranked second only to the 1966 level of production until both were surpassed by record crops in 1970 and 1971. The shortfalls in 1969 and 1972

were caused by above normal winter-kill of winter grains followed by unusually cool and wet growing and harvesting seasons in 1969 and by a severe drought in European U.S.S.R. in 1972. Data for the average annual production and yields of principal crops are shown in Figure 14.

After wheat and rye, potatoes constitute the most important Soviet food crop, especially in the western and central regions of the European U.S.S.R. Since 1960, however, the area planted to potatoes has been falling. In 1972, 19.8 million acres were devoted to

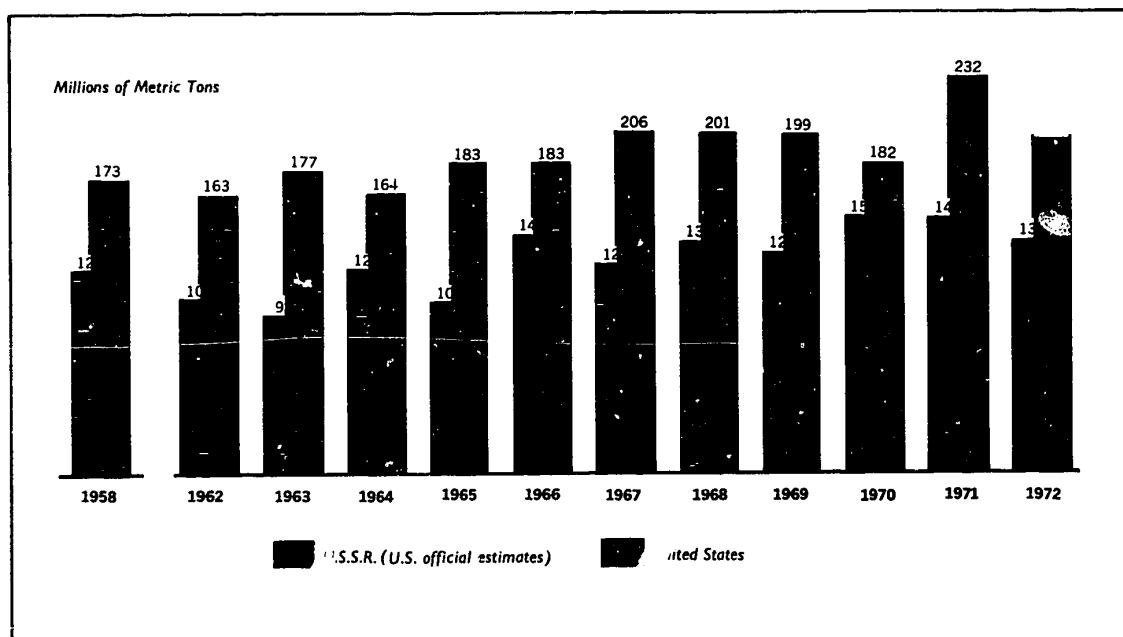


FIGURE 13. Comparison of U.S. and U.S.S.R. grain production (U/OU)

FIGURE 14. Average annual production and yields of principal crops (U/OU)

| | 1956-60 | 1961-65 | 1966-70 | 1971-72 |
|--|---------|---------|---------|---------|
| ----- Million metric tons ----- | | | | |
| Production:* | | | | |
| Total grain and pulses..... | 104.7 | 106.1 | 135.0 | 141.2 |
| Bread grain (wheat and rye)..... | 71.3 | 64.5 | 83.1 | 83.9 |
| Other grain (barley, corn, oats, pulses, millet, rice, buckwheat and miscellaneous)..... | 32.4 | 41.6 | 51.9 | 57.3 |
| Sugar beets..... | 45.6 | 59.2 | 81.1 | 73.9 |
| Sunflower seed..... | 3.4 | 4.7 | 5.9 | 4.9 |
| Potatoes..... | 88.3 | 81.6 | 94.8 | 85.2 |
| Other vegetables..... | 15.1 | 16.9 | 19.5 | 20.0 |
| ----- Metric tons per acre ----- | | | | |
| Yields:** | | | | |
| Total grain and pulses..... | 0.35 | 0.34 | 0.45 | 0.48 |
| Bread grain..... | 0.35 | 0.32 | 0.43 | 0.49 |
| Other grain..... | 0.36 | 0.37 | 0.48 | 0.48 |
| Sugar beets..... | 7.43 | 6.66 | 9.22 | 8.84 |
| Sunflower seed..... | 0.34 | 0.42 | 0.49 | 0.44 |
| Potatoes..... | 3.79 | 3.82 | 4.66 | 4.35 |
| Other vegetables..... | 4.08 | 4.69 | 5.35 | 5.06 |

*Figures for grain crops and sunflower seed are U.S. official estimates; all other production data are given as officially reported by the U.S.S.R.

**Average annual yields, based on official Soviet data on the sown area for the respective crops.

potato production, more than 6% less than in 1950. Although yields have increased moderately, the average annual production of potatoes in 1961-72 was only 10% greater than the average during the preceding decade. In part the small increase was the result of adverse weather during 1972, which caused a record decline of 16% in the output of potatoes.

The principal industrial food crops are sunflower seed and sugar beets. (The main industrial nonfood crops—cotton and fiber flax—are treated below under natural fibers.) Of the 35.6 million acres sown to industrial crops in 1972, sunflower seed accounted for about 30% and sugar beets (exclusive of sugar beets sown for livestock feed) claimed 24%. Oil from sunflower seed is the basic edible vegetable oil used in the U.S.S.R., accounting for roughly three-fourths of the vegetable oil produced in state industrial enterprises. The acreage planted to sunflowers expanded rapidly after 1963, reaching a peak of 12.4 million acres in 1966 before declining to 10.8 million acres in 1972. This reduction has been offset partially by higher yields attributable in part to the development of new varieties with a higher oil content.

The U.S.S.R. is the world's leading producer of sugar beets, producing more than one-third of the global output, or roughly three times as much as the United States, the second largest producer. Expansion of sown area and improving yields resulted in an upward trend in sugar beet production until 1968, but reduced plantings and lower yields have since cut production to less than 80% of the 1968 level.

FIGURE 15. Number of livestock (U/OU) (Millions)

| YEAR* | CATTLE (INCLUDING COWS) | | SWINE | SHEEP AND GOATS | | HORSES |
|-------------|-------------------------------|------|-------|-----------------------|--|--------|
| | | COWS | | | | |
| 1928**..... | 66.8 | 33.2 | 27.7 | 114.6 | | 36.1 |
| 1950..... | 58.1 | 24.6 | 22.2 | 93.6 | | 12.7 |
| 1958..... | 66.8 | 31.4 | 44.3 | 130.1 | | 11.9 |
| 1963..... | 87.0 | 38.0 | 70.0 | 146.4 | | 9.1 |
| 1964..... | 85.4 | 38.3 | 40.9 | 139.6 | | 8.5 |
| 1970..... | 95.2 | 40.5 | 56.1 | 135.8 | | 7.5 |
| 1971..... | 99.2 | 41.0 | 67.5 | 143.4 | | 7.4 |
| 1972..... | 102.4 | 41.2 | 71.4 | 145.3 | | 7.3 |
| 1973..... | 104.0 | 41.7 | 66.5 | 144.5 | | na |

na Data not available.

*Census date is 1 January.

**Present boundaries.

(5) *Livestock and livestock food products*—Since 1950, livestock numbers often have been increased without regard to the available supply of feed (Figure 15). The total supply of feed (in standard feed units of one ton of oat grain) averaged an estimated 200 million metric tons per year during 1959-62, but it declined to less than 180 million metric tons in 1963 and 1964. Feed supplies have trended upward since 1964, however, reaching a peak in 1971, when the supply of available feed units was two-fifths greater than in 1964. As a result, total livestock herds increased moderately during this period, achieving a peak level in 1971; it was not until 1972, however, that hog numbers as well as sheep and goats were restored to the level prevailing before the 1963 agricultural debacle. Although overall livestock numbers appear unchanged in 1972, the amount of usable product attained per animal of most categories of livestock suffered because of feed shortages during the year.

Estimated total production of basic livestock food products is shown in Figure 16.⁴ (Wool is treated below under natural fibers.) The greatest increases in output occurred during 1950-60 before tapering off in 1960-64. After 1964, temporary improvements in the available feed supply provided the basis for more rapid increases in the production of meat and milk. The decline in meat production in the late 1960's reflected not only the decrease in livestock numbers but also the policy of expanding depleted herds. Better feed supplies permitted both output of livestock products and the number of animals to expand during 1970 and 1971 before the disastrous harvest of 1972 led to a decline in meat production during the early months of 1973.

⁴Because a large portion of Soviet livestock is privately owned, verification of Soviet statistics, especially for the production of meat and milk, is difficult. Moreover, no attempt has been made to make the statistics conform to U.S. definitions of products. Information on the output of meat, milk, and other food products processed in state industrial enterprises is presented in Subsection C. 4, e.

FIGURE 16. Output of principal food products (U/OU)
(Millions of metric tons unless otherwise indicated)

| | 1950 | 1960 | 1965 | 1970 | 1971 | 1972 |
|--|-------|--------|--------|--------|-------|------|
| Livestock products: | | | | | | |
| Meat*..... | 4.9 | 8.7 | 10.0 | 12.3 | 13.3 | 13.6 |
| Whole milk..... | 35.3 | 61.7 | 72.6 | 83.0 | 83.2 | 83.2 |
| Eggs (millions of units)..... | 11.7 | 27.5 | 29.1 | 40.7 | 45.1 | 48.2 |
| Fish catch (including marine animals)..... | 1.8 | 3.5 | 5.8 | 7.9 | 7.8 | na |
| Output of food industry:** | | | | | | |
| Meat..... | 1.6 | ***4.4 | ***5.2 | ***7.1 | 8.2 | 8.7 |
| Beef..... | 1.0 | 2.0 | 2.4 | 3.5 | 3.7 | na |
| Pork..... | 0.3 | 1.4 | 1.8 | 2.2 | 2.9 | na |
| Mutton..... | 0.2 | 0.4 | 0.4 | 0.4 | 0.4 | na |
| Poultry..... | Insig | 0.2 | 0.2 | 0.4 | 0.4 | na |
| Other..... | 0.1 | 0.5 | 0.5 | 0.7 | 0.8 | na |
| Milk products..... | 1.1 | 8.3 | 11.7 | 19.7 | 19.7 | 20.0 |
| Butter..... | 0.3 | 0.7 | 1.1 | 1.0 | 1.0 | 1.1 |
| Cheese..... | 0.1 | 0.2 | 0.3 | 0.5 | 0.5 | 0.5 |
| Sugar (granulated)..... | 2.5 | 6.4 | 11.0 | 10.2 | 9.0 | 8.9 |
| Vegetable oil..... | 0.8 | 1.6 | 2.8 | 2.8 | 2.9 | 2.8 |
| Margarine and margarine compounds.... | 0.2 | 0.4 | 0.7 | 0.8 | 0.8 | na |
| Canned foods (billions of cans)†..... | 1.5 | 4.9 | 7.1 | 10.7 | 11.3 | 12.0 |
| Flour..... | 22.0 | 35.0 | 37.0 | 42.0 | 43.0 | na |
| Bread and bakery products..... | 12.4 | 15.5 | 19.7 | 20.0 | 20.0 | 20.0 |
| Macaroni products..... | 0.4 | 1.0 | 1.3 | 1.2 | 1.2 | na |
| Beer (millions of decaliters)..... | 130.8 | 249.8 | 316.9 | 419.0 | 441.0 | na |

na Data not available.

*Slaughter weight, including edible offal.

**The sugar and margarine series cover total production. The milk products series is equivalent to state purchases of milk. The butter and vegetable oil series exclude household production. The meat and cheese series exclude household and collective farm production. The bread and bakery products series excludes household, collective farm, and industrial cooperative production. The scope of the remaining series is not defined.

***Figures do not add to totals because of rounding.

†400-gram or 353-cc. cans.

(6) *Natural fibers*—The most important natural fibers produced in the U.S.S.R. are cotton, flax, and wool. The following tabulation shows domestic production meets practically all the country's requirements for these fibers (1971 data, in thousands of metric tons):

| | GINNED COTTON | FLAX FIBER | WOOL (WASHED) |
|--------------------------|------------------|---------------|------------------|
| Production | 2,414 | 485 | 214 |
| Imports | 243 | 0 | 86 |
| Total availability | 2,657 | 485 | 300 |
| Exports | 547 | 9 | 14 |
| Apparent consumption .. | 2,110 | 476 | 286 |

Imports of cotton and wool provide higher grades of fibers than are generally produced domestically. The Soviet Union also exports natural fibers predominantly to East Europe with some of the cotton shipped to these countries returning as finished cotton goods.

Cotton is the leading fiber crop and principal irrigated crop in the U.S.S.R., with production second only to that of the United States. The output of cotton more than doubled during the period 1950-72 because of increases in the irrigated area sown to cotton, greater application of fertilizer, more effective price incentives, and improved production practices.

The U.S.S.R. produces more than two-thirds of the world output of flax fiber even though the area planted to this crop declined from 4.2 million acres in 1962 to 3.1 million acres in 1972. Although production of wool in 1971 was 19% above the average annual level of 1961-65, it was still inadequate to meet the requirements of the wool textile industry. Preliminary estimates indicate that output in 1972 was about 2% below the 1971 level because the harsh winter increased mortality rates for sheep.

c. Fisheries

With a large and modern fishing fleet, the U.S.S.R. ranks among the leading fishing nations of the world. In 1971 the Soviet Union accounted for about 10.5% of the world's fish catch and about 14% of the global whale catch in the 1970-71 season. The total Soviet catch of fish and marine animals amounted to 7.8 million metric tons in 1971. The catch has more than doubled since 1960 as the result of expansion of fishing on the high seas;⁵ this portion of the catch rose from about 65% of the total in 1960 to roughly 85% in 1971.

The Soviets have relied heavily on the fishing industry to increase the share of animal production in the Soviet diet. In 1971, consumption of fish was 14.8

⁵The term "high seas" refers to oceanic fishing areas and thus excludes the Black, Mediterranean, Caspian, Azov, and Aral Seas.

kilograms per capita compared with 8.9 kilograms in 1959. Production of canned fish increased from 200 million cans (about 71,000 tons) in 1950 to 1,500 million cans (roughly 500,000 tons) in 1971. In addition, the U.S.S.R. has become a net exporter of fish and fish products, although such exports represent only a small share of the total fish catch.

Further development of the fishing industry is planned during the course of the Ninth Five Year Plan for 1971-75 as shown in the following tabulation, in thousand metric tons unless otherwise indicated:

| FISH PRODUCTS | 1970 | |
|--|--------|-------|
| | ACTUAL | PLAN |
| Live and frozen fish | 184 | 295 |
| Smoked and dried fish | 148 | 282 |
| Salt herring | 406 | 554 |
| Fish and whale meal for livestock feed | 393 | 675 |
| Canned fish products (million standard cans) | 1,405 | 1,900 |

As competition for the world's fish resources has become more intense, the U.S.S.R. has begun to participate in international programs to regulate fishing practices and conserve world fish resources. As in other areas, however, Soviet national interests will predominate, and further exacerbation of international fishing tensions and problems can be expected. The Soviets are likely to concentrate increasingly on fishing in the waters of the Southern Hemisphere as the rich northern grounds are depleted or become potential causes of conflicts with the leading non-Communist powers.

d. Adequacy of food supply and diet

The Soviet population consumes about 3,200 calories per day per capita, or almost as much as average per capita consumption in the United States (Figure 17). The Soviet figure has not changed appreciably during the past decade, but the Soviet diet has improved markedly since the early 1950's, although it is still deficient in terms of the share of calories supplied by quality foods such as meat, vegetables, and fruit. Per capita consumption of meat, fish, and fats and oils has doubled since that time, and sugar consumption more than tripled. Conversely, the share of calories supplied by the basic starchy foods—grain products and potatoes—dropped from roughly 70% in 1950 to about 52% in 1971; this share is still more than twice as large as its counterpart in the United States. Furthermore, the lack of any sizable area in the U.S.S.R. suitable for the winter production of fruits and vegetables, the shortage of refrigeration facilities, and the general inadequacy of the

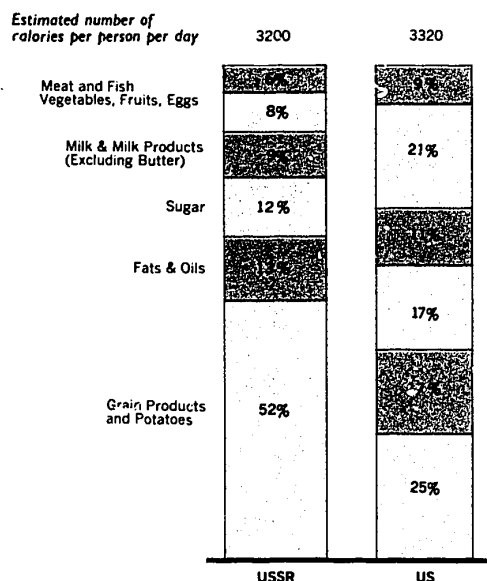


FIGURE 17. Composition of U.S. and U.S.S.R. diets, 1971 (U/OU)

distribution network have imposed a monotonous diet on most of the population during a large part of the year.

The Brezhnev-Kosygin regime is genuinely concerned about raising the quality of the Soviet diet. In 1965, Brezhnev committed the leadership to increasing supplies of high quality foods, especially livestock products, and he decreed a costly investment program to stimulate agricultural production across the board. Nevertheless, meat production grew relatively slowly during the rest of the 1960's. Fueled by rising incomes, however, demand for meat became particularly strong, and beginning in 1969, there were sporadic reports of prolonged local shortages. Early in 1970 the leadership augmented domestic supplies by importing 165,000 tons of meat. The regime continued its commitment to raising the availability of meat supplies by importing a further 225,000 tons in 1971; an increase in domestic production also eased the meat supply situation. In 1972, large meat imports were not needed as domestic production grew sufficiently to permit a 3% increase in per capita consumption of meat.

Because of both the institutional problems besetting Soviet agriculture and the vagaries of the weather, crop production fluctuates widely, occasionally necessitating imports of foodstuffs other than meat.

Grain was imported after poor harvests in 1963, 1965, and 1969, and a record amount was again purchased abroad in 1972. For the next several years substantial imports of grain are likely to become the rule rather than the exception to the extent that the leadership adheres to its program of raising the share of meat in the Soviet diet. This is because the country produces inadequate amounts of feed grains to support rapidly growing herds of livestock even in the best of crop years. Grain imports in the early 1970's permitted the regime to maintain livestock herds as well as the quality and assortment of bread products. Furthermore, imports of substantial quantities of citrus and tropical fruits in recent years are further evidence of the determination by the authorities to raise the dietary quality.

e. Forest resources and products

Forests cover almost 1,850 million acres, or about one-third of the total land area of the U.S.S.R. Nearly one-fourth of the world's forest land capable of producing crops of industrial wood and about one-half of the world's conifers lie within Soviet boundaries. The Soviets, however, have not been able to satisfy their combined needs for home consumption and export despite the enormous volume of standing timber and the fact that the U.S.S.R. produces more timber and lumber than any other country in the world (total log removals in 1971 amounted to 384.8 million cubic meters). This failure is in large part due to the unfavorable geographic location of the U.S.S.R.'s forests in relation to the major consumption centers; three-fourths of the country's forest resources are located east of the Ural Mountains. The movement of wood products imposes a considerable and increasing burden on the transportation system. As a result of the logging industry's concentration in more remote areas, the average length of haul per ton of wood shipped by rail increased from about 530 miles in 1950 to almost twice this distance 20 years later, the highest average length of haul for any commodity moved by rail in the U.S.S.R.

Exports of logs soared from 3 million cubic meters in 1958 to 14.6 million cubic meters in 1971. Exports of lumber, however, grew less rapidly during this period—from 3.6 million cubic meters to 7.9 million cubic meters. Exports of wood products are an important earner of hard currency, with Japan the largest customer for logs, taking 45% of such exports. A substantial increase in timber exports is scheduled during 1969-73 in return for Japanese technical aid in the development of the timber industry in the Soviet Far East.

2. Fuels and power (S)

The rapid development of sources of energy, primarily for industrial use, has always been a priority objective of the U.S.S.R.'s economic development program. The country possesses reserves of mineral fuels and waterpower that exceed those of either the United States or Western Europe; proved reserves of mineral fuels are adequate to meet current production needs and to support continued economic growth. However, the inability of the fuel and power industries to make fine adjustments in operating functions prevents the most efficient use of these resources.

As many of the major fuel-consuming centers are located great distances from sources of better quality fuels, they have been forced to utilize poorer quality, high-cost local fuels. Moreover, the difficulties of transmitting energy over vast distances have led to the concentration of new economic activity in areas with already developed sources of energy. At times this policy has contributed to an overburdening of local energy resources and has resulted in occasional energy shortages. The Summary Map insets in the back show the location of major fuel resources, petroleum refineries, and electrical power facilities. Pipelines are discussed in the Transportation and Telecommunications chapter of this General Survey.

In the postwar period, oil and natural gas rapidly displaced coal as the basic source of energy; in 1950, coal supplied more than three times the amount of primary energy available from petroleum production, but petroleum output has increased so rapidly that

energy from coal in 1970 amounted to less than three-fifths of the energy from petroleum even though the output of coal more than doubled during this period. Figure 18 shows the dramatic shifts in the Soviet fuel balance since 1950. Annual production of individual fuels has frequently deviated from planned output; moreover, the shift to liquid and gaseous fuels has been complicated by imbalances in planning and by the failure of the machine building industry to provide necessary equipment. For example, there is a serious shortage of secondary refining equipment needed to produce high quality gasoline and diesel fuel, and the development of natural gas resources has been retarded by lack of deep-drilling, producing, transmission, and consuming equipment.

Since 1940 the geographical pattern of production of the major fuels and of electric power has shifted. The share of the total Soviet output of fuels and electric power produced in the regions east of the Urals has increased significantly, as is shown in the following tabulation (in percentages based on physical output):

| | 1940 | 1960 | 1971 |
|----------------------|------|------|------|
| Coal | 29 | 36 | 44 |
| Oil | 6 | 7 | 21 |
| Natural gas | 1 | 2 | 31 |
| Electric power | 9 | 22 | 26 |

a. Primary energy

The U.S.S.R. ranks second to the United States among the nations of the world in the total production and consumption of primary energy (including coal,

FIGURE 18. Estimated production of primary energy (C)
(Millions of metric tons of coal equivalents*)

| | 1950 | 1960 | 1965 | 1970 | 1971 |
|-----------------------------|-------|-------|---------|---------|---------|
| Solid fuels: | | | | | |
| Coal | 205.7 | 373.1 | 412.5 | 432.7 | 444.2 |
| Peat | 14.8 | 20.4 | 17.0 | 17.7 | 16.7 |
| Oil shale | 1.3 | 4.8 | 7.4 | 8.8 | 9.5 |
| Fuelwood | 27.9 | 28.7 | 33.5 | 26.6 | 26.6 |
| Subtotal | 249.7 | 427.0 | 470.4 | 485.8 | 497.0 |
| Petroleum: | | | | | |
| Crude oil | 54.2 | 211.4 | 346.4 | 502.5 | 537.3 |
| Natural gas | 7.3 | 54.4 | 149.8 | 233.5 | 250.6 |
| Subtotal | 61.5 | 265.8 | 496.2 | 736.0 | 787.9 |
| Total fuel | 311.2 | 692.8 | 966.6 | 1,221.8 | 1,284.9 |
| Hydroelectric power** | 7.7 | 23.8 | 33.8 | 45.6 | 45.3 |
| Grand total | 318.9 | 716.6 | 1,000.4 | 1,267.4 | 1,330.2 |

*Energy expressed in coal equivalent has a calorific value of 7,000 kilocalories per kilogram.

**Converted at the rate of fuel consumption per kw.-hr. of electricity produced in thermal powerplants.

crude oil, natural gas, hydroelectric power, and peat). The Soviet share of world production increased from about 11% in 1950 to about 17% in 1971. Rapid exploitation of the country's petroleum resources was part of the program adopted after the death of Stalin to modernize the technological structure of the Soviet economy. The share of petroleum and natural gas in the production of primary energy increased from about 19% in 1950 to 59% in 1971, reflecting petroleum's displacement of coal as the major source of primary energy. In 1971, hydroelectric power supplied about 3% of the primary energy produced; fuelwood, oil shale, and peat combined accounted for about 4%.

The U.S.S.R. is a net exporter of petroleum, and in recent years such exports have been its largest single source of foreign exchange. Exports of petroleum increased at an average annual rate of 19% during the period 1956-71; in recent years, however, this rate of increase has fallen substantially. Shipments abroad in 1971 were almost equally divided between Communist (55 million tons) and non-Communist countries (50 million tons). The U.S.S.R. is also a net exporter of coal, although in recent years total exports of this commodity have levelled off. About three-fifths of the coal exported in the last few years was shipped to Eastern Europe. The following tabulation for 1971 shows that imports were negligible and that slightly less than 12% of the total domestic availability of energy was exported:

| | MILLION TONS OF COAL EQUIVALENT | PERCENT |
|--------------------------------|---------------------------------------|---------|
| Supply of energy: | | |
| Production of primary energy* | 1,366.7 | 91.0 |
| Imports | 19.5 | 1.3 |
| Balance at beginning of year | 114.9 | 7.7 |
| Total | 1,501.1 | 100.0 |
| Demand for energy: | | |
| Apparent domestic demand | 1,199.3 | 79.9 |
| Electric and thermal power | 504.8 | 33.6 |
| Technological and other uses** | 694.5 | 46.3 |
| Exports | 180.9 | 12.1 |
| Balance | 120.9 | 8.0 |
| Total | 1,501.1 | 100.0 |

*Total primary energy output is adjusted to include 36.5 million tons of coal equivalent shown in Soviet data as "other sources;" this comprises minor sources of primary energy, such as agricultural wastes, together with some secondary energy.

**Adjusted for losses in transport and storage.

b. Coal

According to Soviet sources, total reserves of coal amounted to 6,800 billion metric tons in 1969. Explored reserves amount to only about 500 billion tons, however, with two-fifths of this total not considered to be economically exploitable at present. As these estimates of reserves do not represent thorough exploration and study of all areas, higher or lower estimates may be forthcoming.

About 76% of total reserves of coal are located east of the Urals, many of them in remote and inaccessible regions. These reserves, moreover, consist mainly of low-quality brown coals that are suitable for little beyond the generation of steam for electric power and heat. West of the Urals, deposits of better quality coal are limited primarily to the Donets, Pechora, and Kizel basins, production from which has not kept pace with the requirements of the area. As a result, the European regions of the U.S.S.R. consume large quantities of bituminous coal from the Karaganda and Kuznets basins in the east. Coal from these areas is transported long distances (as much as 2,300 miles) to the major consuming regions.

Coal output increased rapidly from the end of World War II through the 1950's, when the U.S.S.R. displaced the United States as the leading coal-producing nation of the world. Beginning in the 1960's, the rate of growth in coal production declined in accordance with Soviet energy policy, which called for a more rapid growth in the use of petroleum (Figure 19). Since 1957 the U.S.S.R. has been a net exporter of coal; in 1971 net exports totaled 17 million tons.

In 1971, 75% (about 442 million metric tons) of the coal produced in the U.S.S.R. was bituminous and anthracite; 25% (roughly 150 million tons) was brown coal. Preliminary data for 1972 indicate that total coal output was about 604 million tons.

c. Petroleum

The U.S.S.R. has vast resources of petroleum. However, the lack of modern equipment and technology and the continuation of wasteful production practices is limiting the growth in output of oil and gas, especially as the center of production shifts eastward from the Urals-Volga area to the West Siberian region with its difficult climate, terrain, and working conditions. These Siberian deposits are deeper, more costly to exploit and probably inferior in quality to those in the Urals-Volga area.

The Soviet Union is second only to the United States as a producer of crude oil (Soviet production

FIGURE 19. Production of fuels, by type (C)
(Thousands of metric tons unless otherwise indicated)

| | 1950 | 1955 | 1960 | 1965 | 1970 | 1971 |
|--|---------|---------|---------|---------|---------|----------|
| Solid fuels: | | | | | | |
| Coal: | | | | | | |
| Hard coal* | 181,010 | 267,262 | 355,918 | 397,645 | 432,715 | 442,000 |
| Brown coal | 75,831 | 112,933 | 134,206 | 147,444 | 144,745 | 150,000 |
| Total | 256,841 | 380,195 | 490,124 | 545,089 | 577,460 | 592,000 |
| Peat | 36,000 | 50,800 | 53,600 | 45,800 | 57,400 | 54,300 |
| Oil shale | 4,716 | 10,793 | 14,147 | 21,259 | 24,319 | **26,000 |
| Fuelwood (thousands of cubic meters) | 105,000 | 127,800 | 108,000 | 104,500 | 86,500 | 86,400 |
| Petroleum: | | | | | | |
| Crude oil | 37,878 | 70,758 | 147,191 | 241,732 | 348,791 | 371,800 |
| Natural gas (millions of cubic meters) | 5,369 | 8,370 | 45,303 | 127,666 | 197,945 | 212,398 |

*Bituminous and anthracite.

**Estimated.

data for crude are given in Figure 19 and for refined products in Figure 20). The production of about 372 million metric tons in 1971 represented about one-sixth of total world output and was equivalent to about 77% of U.S. production. Of all the major fossil fuels produced in the U.S.S.R. only crude oil has been produced in excess of planned quantities since 1960. Oil production has generally increased more rapidly than the domestic need for it since 1955, and Soviet exports of crude oil rose from 2.9 million metric tons in 1955 to 74.8 tons in 1971.

The Urals-Volga region has been the major source of crude oil since 1955; in 1971 this area contributed about 55% of total Soviet output. The growth of production in this region was rapid, increasing from 29% of total output in 1950 to about 70% in 1966. Thereafter, its relative share declined steadily to its present level. This rapid growth is attributed primarily to the use of the turbodrill (ideally suited for the shallow hard rock formations encountered) and to the extensive use of waterflooding to increase flow rates. The waterflooding operations, however, were not conducted properly in many of the large oilfields. As a

result, water encroachment has developed in recent years, leading to the loss of a substantial part of the oil in place and a more rapid depletion of reserves. Production from the Urals-Volga fields has nearly levelled off, increasing only from 206 million tons in 1970 to about 210 million tons 1972. It is by no means certain that production from the Urals-Volga fields can be maintained at the present level, and the relative importance of the region in total output is decreasing. Production of crude oil is planned to reach 496 million tons in 1975, but this goal will be difficult to reach as a result of the virtual stagnation in production from the Urals-Volga fields.

Extensive but remote reserves of oil and gas have been discovered in West Siberia, in Central Asia along the eastern shore of the Caspian Sea and in western Kazakhstan, and Turkmenia. Exploitation of these deposits is hampered by the lack of suitable drilling equipment (primarily rotary equipment) as well as by a shortage of large-diameter, long-distance pipelines. There are also inadequate supplies of oil and gas on-site processing equipment for the removal of water, corrosives and contaminants.

FIGURE 20. Estimated output of refined petroleum products (S)
(Millions of metric tons)

| | 1955 | 1960 | 1965 | 1970 | 1971 |
|--|------|-------|-------|-------|-------|
| Gasoline | 13.6 | 23.0 | 31.5 | 45.2 | 48.9 |
| Kerosine | 9.3 | 15.2 | 16.8 | 20.8 | 21.3 |
| Diesel fuel | 12.9 | 27.6 | 47.0 | 69.1 | 73.8 |
| Lubricating oils | 2.3 | 4.5 | 6.6 | 9.3 | 10.0 |
| Heavy fuel oil and other residual products | 21.3 | 43.6 | 71.7 | 107.8 | 115.3 |
| Total | 59.4 | 113.9 | 173.6 | 252.2 | 269.3 |

The increase in output of petroleum products has paralleled the growth in production of crude oil. Total output of petroleum products in 1971 was at 1.5 times the level of 1955 as is shown in Figure 20. Refining capacity for the distillation of crude oil increased from 90 million tons per year at the end of 1955 to about 320 million tons per year at the end of 1971. This primary distillation capacity is adequate to provide most of the supplies of oil products for domestic and export needs. The major deficiency in the refining sector has been the failure to install the necessary secondary facilities (catalytic cracking, catalytic reforming, hydrogen treating, etc.) as rapidly as needed to increase the yield and improve the quality of distillates. Diesel fuel, in particular, has been in short supply at times both because of the heavy demand during the harvest season and because of the decision to export this product to earn foreign exchange.

Natural gas is produced in association with, as well as independently of, crude oil. About nine-tenths of the natural gas produced in the U.S.S.R. comes from nonassociated gas fields. Proved and probable reserves of nonassociated natural gas have increased impressively since 1950, as shown below (end-of-year data in billions of cubic meters):

| | |
|------------|--------|
| 1950 | 149 |
| 1955 | 492 |
| 1958 | 988 |
| 1965 | 3,411 |
| 1970 | 15,795 |
| 1972 | 18,000 |

The ratio of proved reserves to annual production has fallen drastically as the production of natural gas increased from about 9 billion cubic meters in 1955 to 212 billion cubic meters in 1971. The U.S.S.R. has ranked second among the world's producers of natural gas since 1963. Its production, however, has repeatedly fallen short of planned output because of shortages of equipment.

Proved and probable Soviet reserves of natural gas are claimed to be more than two times those of the United States, but Soviet technicians use estimating criteria that are less stringent than those employed in the United States. The ratio of proved reserves to annual production at the major gas deposits in the European U.S.S.R. has fallen drastically as output rose from about 9 billion cubic meters in 1955 to 212 billion cubic meters in 1971. The vast Siberian deposits are relatively unexploited, and the extent of proved and probable categories in this area is unknown.

Soviet output of natural gas in 1971 was equivalent to only about 33% of U.S. output. Failures in meeting

past goals for output, primarily due to shortages of deep-drilling, producing, consuming, and pipeline transmission equipment, resulted in lowering the 1973 goal from the original range of 250 to 238 billion cubic meters. The prospects, moreover, are unfavorable for meeting the 1975 production goal of 320 billion cubic meters. The growth of the gas transmission pipeline system from only 3,020 miles in 1955 to an estimated 43,750 miles at the end of 1971 has been a major accomplishment of the industry. Use of large-diameter pipe is widespread and far more common than in the United States. Pipeline connections enable the U.S.S.R. to export small quantities of natural gas to Poland and Czechoslovakia—a total of about 4.6 billion cubic meters in 1971; in the same year the Soviets imported 8.1 billion cubic meters of natural gas from Iran and Afghanistan. Agreements concluded with Austria, West Germany, Italy, France, and Finland call for the U.S.S.R. to export about 18.5 billion cubic meters annually during the latter half of the 1970's. Commitments to East Europe will rise to roughly 18 billion cubic meters.

As total production of natural gas has increased, the relative importance of natural gas produced in association with crude oil has declined from 34% of the total output of natural gas in 1955 to about 11% in 1971. Even though an amount equal to nearly one-third of the annual production of associated gas has been lost for lack of gathering facilities, production of associated natural gas increased from 16.5 billion cubic meters in 1965 to 22 billion cubic meters in 1970; output is planned to reach 24 billion cubic meters in 1975. Associated natural gas has become increasingly important as a raw material for the chemical industry. The U.S.S.R. has been slower than the United States to recognize the potential of natural gas liquids, particularly of liquefied petroleum gas. Only with the establishment of a petrochemicals industry and the desire to supply gas to rural regions have Soviet officials taken action to increase the production of natural gas liquids. Production of liquefied petroleum gas increased from 0.5 million metric tons in 1959 to 5.2 million metric tons in 1971 compared with about 62 million tons produced in the United States in 1971; Soviet output is planned to reach 9 million tons in 1975.

d. Electric power

The Soviet electric power industry ranks second in the world behind the United States in capacity, output, and general technical advancement. At the end of 1972, installed capacity of powerplants in the U.S.S.R. totaled approximately 186,000,000 kilowatts (kw.), or about 44% of U.S. powerplant capacity.

Soviet power production during 1972 was 858 billion kilowatt-hours (kw.-hrs.), roughly 43% of the total generated in the United States and 37% on a per capita basis. There are great regional variations in power availability in the U.S.S.R., but power systems in the developed areas of the country, where the bulk of facilities are located, have achieved a high degree of reliability. Exports comprise an extremely small fraction of the total Soviet power output, with almost all exported power transmitted to East Europe. Limited amounts of power also go to Norway, Finland, and Iran. Net exports in 1972 amounted to about 7 billion kw.-hrs., or 0.8% of Soviet power output.

Industrial consumption of electric power in 1972 amounted to approximately 58% of total output; after discounting transmission losses, powerplant use, and net exports, the industrial share of final consumption was approximately 68%. The principal users are enterprises in the metallurgical, nuclear materials, fuel-processing, chemical, and machine-building branches of industry. The share of power allocated for residential use in the Soviet Union is much smaller than that in developed Western countries. The electric energy consumed by industry and various other sectors of the economy in 1972 was approximately as follows:

| CLASS OF USE | BILLION KW.-HR. | PERCENT OF TOTAL OUTPUT |
|---------------------------|--------------------|----------------------------|
| Industrial | 497.6 | 58.0 |
| Municipal | 97.8 | 11.4 |
| Transmission losses | 66.0 | 7.7 |
| Transportation | 32.6 | 7.3 |
| Powerplant use | 38.3 | 6.8 |
| Rural | 51.5 | 6.0 |
| Construction | 17.2 | 2.0 |
| Net exports | 7.0 | 0.8 |
| Total | 858.0 | 100.0 |

Changes in the pattern of power use are anticipated to be slight as only the share for rural electrification is likely to show a significant increase during the next 5 years; the overall growth of output will be reflected in increases in consumption by all users. Except in the most isolated regions, virtually the entire population has some electric power supply, although domestic service continues to be interrupted occasionally to meet industrial needs.

Power consumption is greatest in the industrial areas of the central and northwestern European U.S.S.R., the eastern half of the Ukraine, and the central and southern Urals. There also are a number of large power consumers, such as uranium isotope separation plants and aluminium plants, located in central Siberia where conditions are favorable for the production of

low-cost electric energy. More than 85% of known Soviet fuel and hydroelectric resources are located in the eastern regions of the country, whereas 80% of the electricity is consumed in the European part. About 75% of the electric power currently produced is in the areas of heavy consumption. Capacity is growing in the eastern areas, however, as low-cost fuel and unexploited hydropower resources become scarce in the west. As a result, future plans call for large blocks of power to be supplied from east of the Urals over very high voltage, long-distance transmission lines.

Conventional thermal powerplants contributed approximately 82% of the total Soviet production of electricity in 1972; hydroelectric powerplants accounted for about 14%, internal combustion powerplants supplied about 3%, and roughly 1% was from nuclear powerplants. About half the fuel burned at thermal powerplants is coal, with natural gas accounting for 22%, fuel oil 21%, and peat 4%; the remainder is shale oil and other miscellaneous fuels.

Soviet powerplants are generally large, modern, and fairly efficient. Almost 75% of the nation's generating capacity is in machinery less than 15 years old, and 30% of thermal powerplant equipment is less than 5 years old. The two most powerful generating plants in the world are the Krasnoyarsk Hydroelectric Station (6,000,000-kw.) and the Bratsk Hydroelectric Station (4,100,000-kw.). The U.S.S.R. has seven thermal generating plants rated at 2,400,000 kw. installed capacity. Both hydroelectric and thermal generating plants are under construction with even greater capacity.

Some of the U.S.S.R.'s giant powerplants incorporate equipment of record size. The 500,000-kw. generators at Krasnoyarsk are the most powerful hydroelectric generating units in the world. Even larger units are to be introduced at the Sayan Hydroelectric Station, now under construction to the south of Krasnoyarsk on the Yenisey River. New thermal powerplants are currently being equipped with 200,000- and 300,000-kw. turbogenerators, with 500,000- and 800,000-kw. units being introduced. Although smaller than the million-plus kilowatt units in a few U.S. powerplants, the Soviet units also operate on steam at supercritical pressure and temperature, and are approaching the thermal efficiency of their U.S. counterparts.

Transmission of electric energy in the U.S.S.R. is accomplished by well-developed networks which incorporate more than 95% of the country's generating capacity and cover virtually all developed areas. These networks provide generally reliable service and are adequate to meet normal demands, but there is

relatively little provision for alternate routing among the major intersystem ties. The seven major power networks which serve the European areas of the U.S.S.R. have been linked to form the Unified Power System of European U.S.S.R., with a total installed capacity of 120 million kw. at the end of 1972. Extensive transmission systems also serve central Siberia, northern Kazakhstan, southern Central Asia, and the Soviet Far East.

Transmission lines with voltages of 220, 330, and 500 kilovolts (kv.) form the backbone of Soviet transmission networks, with 110 kv. lines used in local power grids. Several international powerlines are in operation across the western borders of the U.S.S.R., including 400-kv. circuits to Czechoslovakia, Hungary, and Romania, and 220-kv. lines to Poland; a new 400-kv. line to Bulgaria is nearing completion. A prototype 750-kv. line is in operation in the Moscow area, and a similar line is under construction in the Ukraine. An experimental 800-kv., direct-current powerline also has been in operation for several years between the Volgograd hydroelectric station and the Donets Basin in the eastern Ukraine. Soviet power authorities plan to develop even higher voltage lines to make practicable the transfer of power over longer distances. For example, a 1,500-kv. direct-current powerline is being designed to convey current from giant thermal powerplants under construction near the extensive Ekibastuz coal deposits in northeastern Kazakhstan to the central European U.S.S.R.

The Five Year Plan calls for increasing installed electric power capacity to 232 million kw. and annual production to about 1.065 billion kw.-hrs. in 1975; comparable figures for 1970 were 166.2 million kw. and 740.9 billion kw.-hrs. This increase is to come chiefly from the addition of larger and more efficient generating units at large regional thermal powerplants. Hydroelectric construction during 1971-75 will be concentrated mainly on a few large projects to complete the harnessing of the Dnepr, Volga, and Kama Rivers in European U.S.S.R. and the Yenisey and Angara Rivers in central Siberia. Nuclear powerplants with a total capacity of 7,200,000 kw. are scheduled to go into operation during 1971-75: four times this capacity, or 30,000,000 kw., is projected by 1980-85. These plants will be located principally in European areas, where fuel resources are scarce.

The extension and consolidation of transmission facilities is planned, with special emphasis on joining the regional networks in order to form the United Power Network of the entire U.S.S.R. During the current 5-year plan, the Soviets intend to introduce powerlines of much greater length, voltage, and

capacity to convey low-cost power to the Urals and European U.S.S.R. from giant thermal and hydro powerplants in central Siberia, where enormous deposits of easily mined brown coal and excellent hydropower sites exist.

The Soviet Union has achieved world leadership in the construction of hydroelectric generating equipment, in terms of both technology and unit capacity. But in steam turbine and generator technology, it lags behind the United States, and the Soviets have encountered some problems in designing and producing new large turbogenerators. The capacity of the Soviet electrotechnical industry is adequate to supply the generating equipment required during the current plan period and to export some equipment to East Europe and to less developed countries. During the period 1971-75, the output of equipment is to be increased by adding new capacity at machine-building plants, and by increasing the average unit capacity of the aggregates produced.

3. Minerals and metals (S)

The Soviet metallurgical industry, one of the largest in the world, is first in the production of pig iron, steel, and many ores and basic materials; it ranks second in the output of copper, lead, aluminum, and nickel. (For the location of production centers, see the Metallurgy inset on the foldout Summary Map.) The industry probably has the largest raw material base in the world, but reserves of high-grade ores—particularly certain nonferrous ores—are declining. Furthermore, considerable portions of the country's ore reserves cannot be recovered economically with available technology and equipment. The U.S.S.R., however, has demonstrated its ability to develop special alloys essential to the attainment of its military and strategic goals, although the general trend has been more toward improving technology for quantity rather than for quality production.

a. Minerals

(1) *Iron ore*—Soviet reserves of exploitable iron ore in 1970 exceeded 100 billion tons, accounting for more than 40% of the world total. As this ore generally is of only average quality, it requires considerable upgrading, as evidenced by the large-scale program for construction of concentrating, sintering, and pelletizing plants. The U.S.S.R. is the world's largest producer of iron ore, providing completely for its own needs and furnishing more than 80% of the requirements of Eastern Europe.

FIGURE 21. Production of usable iron ore and ferroalloying materials (C)

| | 1955 | 1960 | 1965 | 1970 | 1971 | 1972 |
|---|-------|-------|---------|---------|---------|---------|
| <i>Millions of metric tons</i> | | | | | | |
| Usable iron ore..... | 71.9 | 105.9 | 153.4 | 195.5 | 203.0 | 208.0 |
| Ferroalloying materials: | | | | | | |
| Manganese ore..... | 4.7 | 5.9 | 7.6 | 6.8 | 7.3 | 7.5 |
| <i>Thousands of metric tons</i> | | | | | | |
| Chromite, Cr ₂ O ₃ content..... | 304.0 | 520.0 | 1,160.0 | 1,380.0 | 1,400.0 | 1,420.0 |
| Tungsten concentrates, 60% WO ₃ basis..... | 7.5 | 11.4 | 14.0 | 14.5 | 15.2 | 15.5 |
| Molybdenum content of ores and concentrates.... | 2.8 | 4.8 | 7.3 | 9.5 | 9.5 | 9.8 |
| Nickel, refined..... | 46.0 | 72.0 | 100.0 | 137.0 | 148.0 | 156.0 |
| Cobalt content of ores mined..... | 0.9 | 1.6 | 3.4 | 4.7 | 4.8 | 5.0 |

(2) *Ferroalloying materials*—The U.S.S.R. has abundant reserves of ferroalloying materials—manganese, chromite, tungsten, molybdenum, nickel, and cobalt—and is a leading producer in the world of these ores. Production of ferroalloying materials is shown in Figure 21.

Among the major steel-producing countries of the world, only the U.S.S.R. is self-sufficient in manganese. Soviet reserves of more than 2 billion tons of ore are second only to those of South Africa. The U.S.S.R. is the largest producer of manganese ore in the world, accounting for about one-third of total production. Production of manganese exceeds domestic requirements, leaving a sizable surplus for exports, which amounted to 1.3 million tons, or about one-sixth of production, in 1972.

With the largest explored reserves of chromite in the world, the U.S.S.R. is the leading producer of chrome ore. In 1972 the Soviets mined about 3.2 million tons of chrome ore with an estimated chromic oxide content of 1.4 million tons. In that year they exported 1.1 million tons of chrome ores and concentrates, of which about 80% went to non-Communist countries, including the United States. The Soviet Union also claims to have the world's largest explored reserves of nickel, tungsten, and molybdenum. It is the largest producer of tungsten concentrates, accounting for about 30% of world production in 1971, and is second only to Canada in the production of refined nickel.

(3) *Nonferrous ores*—The Soviets are largely self-sufficient in nonferrous ores but imports of aluminum raw materials have increased in recent years; lead and zinc ores and concentrates as well as tin and uranium are also imported. Reserves of aluminous raw materials—mainly bauxite and nepheline—are very large, but are inadequate for meeting the growing requirements of the Soviet aluminum industry. Deposits of high quality bauxite, after years of

exploitation, are believed to be nearing exhaustion, and the economic significance of the extensive remaining reserves is reduced by the generally low alumina and high silicon content of most of the ores and by the unfavorable location of some deposits.

Extensive reserves of nepheline ores represent a practically inexhaustible source of alumina, but the Soviets apparently have found the processing of nepheline to be too costly to warrant wider use under present conditions. Soviet exploitation of domestic raw materials has not kept pace with the growth of the aluminum industry with the result that imports of bauxite and alumina have grown considerably in recent years; imports represented about 40% of total requirements in 1972.

Soviet reserves of lead, with an estimated metal content of 18-20 million tons, are second only to those of the United States. The reserves are concentrated in Kazakhstan, which contains about two-thirds of total Soviet reserves. The bulk of the ore mined is obtained from low-grade polymetallic lead-zinc deposits which are generally worked inefficiently by costly underground methods. The average lead content of Soviet reserves has been declining steadily and is lower than that of major western lead reserves.

The U.S.S.R. also has large reserves of zinc which, with an estimated metal content of 30 million tons, are almost as large as those of the United States. About one-half of these reserves is found in Kazakhstan. The average zinc metal content of Soviet ore has declined as higher grade reserves have been exploited and newly discovered deposits contain lower grade ores. Most of the zinc ore output is mined from polymetallic lead-zinc deposits.

Measured reserves of copper amounted to nearly 53 million tons of contained metal in 1965. These reserves may have been increased in recent years, but are probably not as large as estimated U.S. reserves of nearly 70 million tons. The principal deposits

currently being exploited are located in Kazakhstan. Of major significance for the future is the large Udokan ore body in the Transbaikal region of Eastern Siberia which reportedly has the potential to yield 400,000 tons of refined copper for over 50 years. The quality of the Udokan ore, according to available information, is high, averaging 1.5% to 2% copper content. In general, however, the quality of Soviet reserves of copper is low, probably averaging less than 1%.

Tin resources are located primarily in the Far East and Eastern Siberia. Additional deposits of tin in Kazakhstan and Soviet Central Asia hold little promise for making a significant contribution to Soviet supplies. Soviet ores are complex and low in tin content, usually requiring initial concentration at the mine sites. Concentrates containing 10% to 30% tin are shipped to central facilities where further processing yields concentrates with a tin content as high as 70%. Domestic production from Soviet ores, however, has been inadequate to meet demand, and imports have been required.

The uranium available to the U.S.S.R. from domestic production is augmented by imports from East Europe, chiefly East Germany and Czechoslovakia. Approximately 16 to 17 thousand tons of uranium metal per year are available from all sources for the Soviet atomic energy program. The main uranium mining and ore concentrating areas in the U.S.S.R. are the Krivoy Rog iron ore district in the Ukraine, Central Asia, and the Caucasus. Ore concentration plants are well designed and have substantial capacities (500 to 1,000 tons of ore per day), although several plants have considerably larger capacities. Newer plants use the modern ion exchange and solvent extraction methods.

The principal Soviet deposits of vein and placer gold are located in Uzbekistan and in the basins of the Lena, Kolyma, Indigirka, and Aldan rivers in the northeast part of the country. Production of gold increased from an estimated 155 metric tons in 1965 to 255 tons in 1972. Almost half of this increase is accounted for by operations at the recently constructed Muruntau plant in Uzbekistan, which will achieve full production of 90 tons annually by 1975. Another Uzbek plant at Chadak was completed in late 1972, but its capacity is not known. The Soviets also are building new plants at Aytym in Kazakhstan and at Zod in Armenia; these plants are scheduled to come on stream by 1975.

b. Metals

(1) *Ferrous metals*—In 1971-72 the U.S.S.R. moved ahead of the United States as the world's largest steel

FIGURE 22. Pig iron and steel production (U/OU)
(Millions of metric tons)

| | PIG IRON | CRUDE STEEL | ROLLED STEEL |
|-----------|----------|-------------|--------------|
| 1950..... | 19.2 | 27.3 | 20.9 |
| 1955..... | 33.3 | 45.3 | 35.3 |
| 1960..... | 46.8 | 65.3 | 51.0 |
| 1965..... | 66.2 | 91.0 | 70.9 |
| 1970..... | 85.9 | 115.9 | 92.5 |
| 1971..... | 89.3 | 120.7 | 95.9 |
| 1972..... | 92.3 | 126.0 | 99.4 |

producer, an accomplishment that was the culmination of years of steady growth since World War II. Prompt reconstruction of war-damaged facilities and a continuing high priority in investment allocations enabled the Soviets to sustain a remarkably uniform series of annual increases in output: 3 to 4 million during the 1950's and 5 million tons during the 1960's and early 1970's (Figure 22). A dominant trend has been the concentration of production in large modern plants. In 1972 the 10 largest plants accounted for more than half of total production, and the two dozen largest plants produced roughly three-quarters of total output.

Notwithstanding its record of steady growth, the Soviet steel industry has been hampered by perennial lags in the construction of new capacity. These shortcomings have set back programs to introduce new technology, to retire outmoded facilities and to improve the quality and broaden the assortment of products. The leadership has criticized the industry repeatedly for failing to provide the economy with new and improved types of steel products.

Soviet production of pig iron (including blast furnace ferroalloys) in 1972 amounted to 92.3 million tons, of which about 90% was used for steelmaking and the remainder for iron castings. At the beginning of 1973 the Soviets had an estimated 98 million tons of blast furnace capacity, the sector of the iron and steel industry in which the Soviets have demonstrated their highest level of technical proficiency. In 1972 the U.S.S.R., with about 135 blast furnaces in operation—roughly half the number in the United States—exceeded U.S. production of pig iron by 14%. Soviet blast furnaces are second only to those in Japan in terms of size and productivity. Steady improvements in performance have been achieved by converting furnaces to high top pressure, using natural gas as fuel, injecting oxygen into the blast, and adopting efficient cooling and moisture control systems.

At the beginning of 1973 the steelmaking capacity of the U.S.S.R. was estimated at about 135 million tons, or 87% of U.S. capacity. Most of the steel

produced in the U.S.S.R. is made by the traditional open hearth process. Although only a few new open hearth furnaces have been constructed since 1965, production of steel by this method has expanded, reflecting the Soviet policy of intensifying operations at existing open hearth shops to compensate for the lag in adopting the newer oxygen converter process. In contrast, production of open hearth steel has declined markedly in the United States since 1964 as rapid gains have been made in the production of steel by the oxygen converter. Only about 10% of Soviet steel is produced in electric furnaces compared with about 18% in the United States and Japan.

The U.S.S.R. has performed creditably with respect to specialized steelmaking processes required to produce alloys for aircraft and missile programs. The Soviets are the world's leaders in the development of electroslag remelting and plasma arc remelting; they have licensed this technology for use in Japan and Western Europe. In the area of electron beam remelting, the U.S.S.R. has made considerable progress, using some domestically manufactured equipment as well as a large number of electron beam furnaces imported from East Germany. The Soviets also use vacuum arc (consumable electrode) and vacuum induction melting processes, but to a lesser extent than in the West, largely because they rely heavily on electroslag remelting as a less costly way of improving steel quality.

Soviet technicians have pioneered the development of continuous casting of steel to eliminate conventional ingot casting and associated blooming and slabbing operations. The U.S.S.R., nevertheless, has fallen behind the United States and Japan in the installation of capacity for continuous casting; in 1971, Soviet capacity amounted to 11 million tons compared with about twice that amount in the United States and Japan. Moreover, progress in expanding production has been slow. In 1972, annual output from continuous casting installations was only 5.5 million tons, far behind the original 10 million-ton goal for 1965.

Soviet rolling and finishing technology is less advanced than in the United States. This lag stems from past emphasis on iron and steelmaking technology and from the long lead times required to design, manufacture, and install the more complex types of rolling mill equipment. The U.S.S.R. has fallen behind particularly in the application of automated techniques to rolling mill processes and in the development of many types of finishing line equipment critical to the output of high-quality products.

Soviet steel products do not meet all the needs of the economy because the composition of output has been geared to the requirements of heavy industry. Accordingly, structural steel plate and profiles, heavy sheet, rails, bars, and castings dominate the industry's product mix. With the growth in the automotive, consumer durable, and container and packaging industries, however, the demand for light flat rolled steel and special surface finish has been rising. During the past decade the output of flat rolled products has increased at a somewhat more rapid rate than that of finished steel as a whole, but flat rolled steel still constitutes less than 40% of the output of rolled products in the U.S.S.R. compared with more than 60% in the United States. In particular, the production of cold rolled sheet—especially cold rolled sheet with deep drawing qualities, tin plate, galvanized sheet, and high quality transformer sheet, which are all produced from flat rolled stock—has been lagging.

Soviet exports of steel mill products have increased steadily from 3.0 million tons in 1960 to a stable level of 7.0 to 7.5 million tons during 1969-72. Imports fluctuated in a narrow range of 1.5 to 2.0 million tons during most of the 1960's. Towards the end of the decade, however, they began to increase, reaching 3.0 million tons in 1970 and about 4.0 million tons in 1972, as larger amounts of foreign steel were required to compensate for lags in domestic output. Since the late 1960's the U.S.S.R. has obtained the larger share of its imports of steel from non-Communist countries. Imports from these areas have consisted primarily of large-diameter pipe, other tubular products, flat rolled steel, and light structural shapes.

On balance, the U.S.S.R. has regularly been a net exporter of steel. During 1960-72 net exports represented about 5% of domestic production. From a peak level of 4.6 million tons in 1970, however, net exports declined to about 3.0 million tons in 1972, reflecting the pinch on domestic supplies. About four-fifths of Soviet exports of steel mill products are regularly directed to the East European Communist countries, with the largest share sent to East Germany. Nearly all of the remaining exports go to the developing countries.

(2) *Nonferrous metals*—The U.S.S.R. is self-sufficient in most nonferrous metals. Aluminum, copper, zinc, and lead are produced in large enough quantities to permit net exports, but there are shortages of tin. The estimated supply position of major nonferrous metals in 1971 is shown in Figure 23.

Since 1961 the U.S.S.R. has been the world's second largest producer of aluminum (Figure 24). Exports of

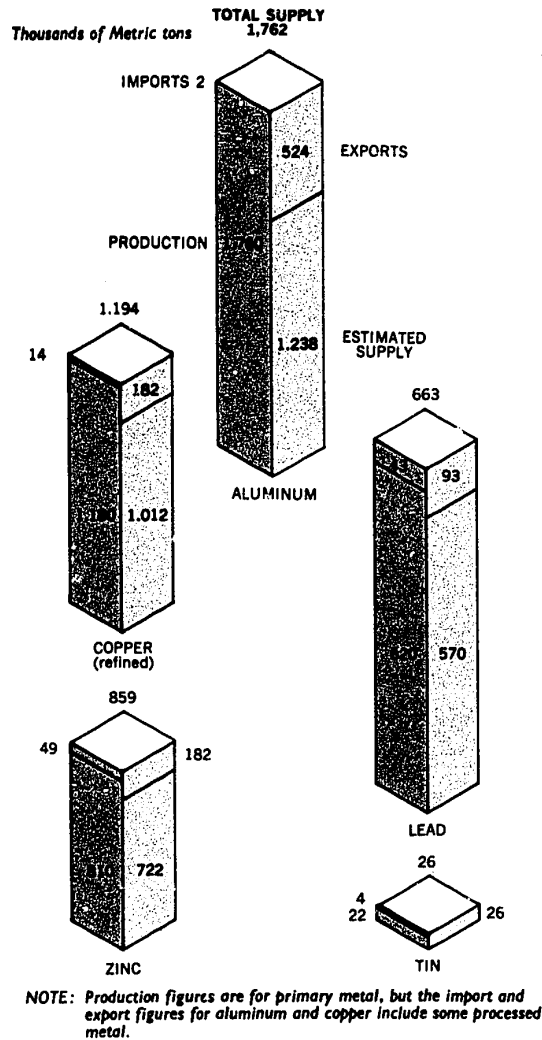


FIGURE 23. Estimated supply position of principal nonferrous metals, 1971 (C)

aluminum ingots and rolled products also have been growing steadily, reaching about 600,000 tons in 1972. Soviet exports of aluminum have, in fact, increased at a more rapid rate than domestic consumption. The larger share of these exports has gone to Eastern Europe, principally East Germany. Domestically, gains have been made in certain applications, particularly as a substitute for copper in long-distance transmission lines, but the Soviets have not put aluminum to the many and varied uses found in developed non-Communist countries.

FIGURE 24. Estimated production of principal non-ferrous metals* (C)
(Thousands of metric tons)

| | ALUMINUM | COPPER** | LEAD | ZINC | TIN |
|-----------|----------|----------|------|------|------|
| 1955..... | 430 | 377 | 258 | 222 | 7.6 |
| 1960..... | 630 | 490 | 324 | 364 | 10.6 |
| 1965..... | 1,000 | 772 | 433 | 504 | 11.0 |
| 1970..... | 1,720 | 1,100 | 597 | 730 | 21.3 |
| 1971..... | 1,760 | 1,180 | 620 | 810 | 22.0 |
| 1972..... | 1,870 | 1,250 | 650 | 825 | 23.0 |

*Primary production.

**Refined.

The U.S.S.R. is the second largest copper producer in the world after the United States and a net exporter of this metal since 1964. Only small quantities of copper have been imported since that time whereas the trend of exports has been steadily upwards, exceeding 200,000 tons in 1972. The principal recipients are other Communist countries, principally East Germany and Czechoslovakia, but appreciable quantities also have been shipped to Western Europe. Soviet policy, however, is to conserve copper by encouraging the substitution of more abundant and cheaper metals, particularly aluminum. About half of the copper consumed is accounted for by electrical applications such as cable, wire, busbars, contacts, and transformers.

The U.S.S.R. is also a large producer and consumer of lead. Although some lead ores and concentrates are imported to augment domestic supplies, the output of metallic lead is adequate to permit the Soviets to be modest net exporters. The principal Soviet uses of lead are in the manufacture of batteries, cable coverings, and solder.

The Soviet Union imports small quantities of zinc ores and concentrates, but it has been a net exporter of zinc metal since 1957. The two principal recipients of Soviet zinc are East Germany and Czechoslovakia, although significant quantities also are exported to Western Europe, India, and Egypt. Soviet imports of zinc are obtained primarily from Poland and North Korea. About 70% of the zinc metal available to the Soviet economy is used in galvanizing, in producing brass and bronze, or in diecasting alloys. Large amounts of ingot metal are consumed in the production of zinc oxide for use in the rubber and paint industries, and efforts are being made to obtain zinc oxide from such other sources as stack-gases of slag-fuming installations.

Among the Communist countries, the U.S.S.R. is the largest producer of primary tin, but domestic consumption has exceeded production for more than a decade. Prior to 1962, however, the Soviets were able

to procure substantial amounts of tin because they were able to export even larger amounts from Communist China. During the past decade imports from Communist China have been insignificant, and the Soviets have had to buy 4,000 to 8,000 tons annually from non-Communist countries.

4. Manufacturing

a. General (C)

The Soviet manufacturing sector accounts for two-thirds of the country's total industrial production and about one-fifth of its gross national product. Manufacturing, in turn, is dominated by the U.S.S.R.'s largest industry, the machine building and metalworking (MBMW) branch, which produces half of the output of the manufacturing sector. The five other branches of this sector produce soft goods (light industry), paper and pulp products, processed food, forest products, and chemicals.

Since 1960 national priorities within the manufacturing sector have favored the MBMW and the chemical branches. As Figure 25 indicates, the shares of these two branches have increased at the expense of the remaining four branches. This trend, moreover, will continue during the 1971-75 plan period, with MBMW and chemicals scheduled to grow by an average annual rate of more than 11%. If these plan targets are fully met, which is not likely, these two

branches would account for almost 65% of all manufacturing by 1976.

During 1971-72 the manufacturing sector grew by 5.7% annually, a rate well in excess of the estimated rate of growth of 4.8% for all industry. Within manufacturing, however, growth rates in excess of 7% were registered by the MBMW and chemical industries (Figure 26). Growth rates of less than 3% a year in the processed food and soft goods branches were chiefly responsible for the poor performance of the manufacturing sector in the early 1970's.

b. Machinery, equipment and fabricated metal products (S)

Almost all of the machinery, equipment, and fabricated metal products manufactured in the U.S.S.R. are produced by the MBMW industry.⁶ Although this industry depends primarily on the metallurgical industry for semifinished materials, the production of castings and forgings is largely concentrated in the MBMW industry itself. The MBMW industry supplies a large part of its output to the construction, agricultural, and transportation sectors of the economy. However, machine building is also one of its own best customers, because it consumes a large share of the output of all types of industrial equipment. Despite repeated Soviet announcements of programs designed to make the machine-building industry the most highly automated in the world, these programs have not been successfully implemented; the industry remains generally inferior in plant technology and efficiency to the machine-building industries of the West.

The MBMW industry is marked by strong vertical integration, although less so than in earlier years. The opportunities for greater specialization and subcontracting have never been fully realized, primarily because the materials supply system is so erratic and undependable that most producers are unwilling to entrust the manufacture of essential work pieces, parts, and components to other plants. As a result, Soviet industry does not approach the level of plant specialization and subcontracting found in U.S. machinery industries.

⁶In addition to what is broadly defined as machinery (nonelectrical and electrical) in the United States, the Soviet definition of machinery includes all types of transportation equipment, military equipment, and all professional, scientific, and control instruments, including such products as photographic equipment, optical goods, and timepieces. This industry also fabricates metal products such as cable, metal fasteners, structural metal pieces, and metal containers and utensils. In addition, a substantial amount of repair of industrial equipment is performed in the specialized repair facilities of the machine building and metalworking industry.

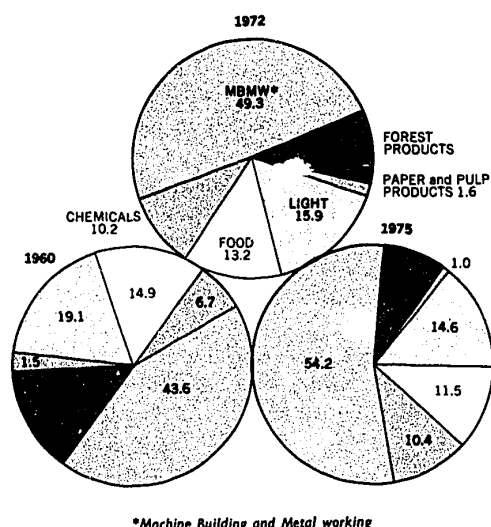


FIGURE 25. Distribution of manufacturing output (C)

FIGURE 26. Average annual rates of growth in branches of manufacturing, 1951-72 and 1971-75 plan (C)
(Percent)

| | 1951-60 | 1961-65 | 1966-70 | 1971-72 | 1971-75 PLAN |
|--------------------------------------|---------|---------|---------|---------|-----------------|
| Manufacturing..... | 9.1 | 6.4 | 6.7 | 5.7 | 9.3 |
| Chemicals..... | 10.5 | 12.1 | 9.1 | 7.2 | 11.5 |
| Machine building and metalworking... | 10.3 | 7.8 | 7.1 | 7.6 | 11.4 |
| Forest products..... | 6.6 | 3.0 | 3.5 | 3.8 | 5.8 |
| Paper and pulp products..... | 3.2 | 7.7 | 7.9 | 5.1 | 5.8 |
| Soft goods..... | 9.0 | 2.4 | 8.0 | 2.9 | 6.6 |
| Processed food..... | 8.2 | 7.0 | 4.7 | 2.5 | 6.2 |

By any standard, machine building and metalworking is the largest of all Soviet industries. It has consistently enjoyed a high priority of development, not only because it is a key industry in the achievement of national economic growth but because of its strategic importance as the supplier of equipment for defense and space programs and of instrumentation for scientific investigation.

Although highly successful in applying the principles of mass, large-scale production to the manufacture of standard stock items, Soviet machine building has had an undistinguished record in the development of technologically advanced and sophisticated products. Thus the product mix of Soviet machine building is obsolescent by Western standards. This situation is largely a fault of the system; changes in the product mix and production methods are inhibited by the prospects of lowered output (and thus reduced or no bonuses) for the firm during the lengthy period needed to retool and incorporate the new technology. Also, the estrangement in the Soviet Union between research and development, on the one hand, and production engineering, on the other, contrasts strongly with the teamwork generally found within comparable enterprises in market-oriented economies. This estrangement tends to rob the Soviet economy of a source of more dynamic economic growth.

The U.S.S.R. is a net importer of machinery and equipment. It relies to a great extent on imports from both East Europe and the industrial West for transportation equipment and for equipment needed by the motor vehicle, chemical electronics, food, paper, and textile industries. These imports have been dictated not only by the inadequacy of the Soviet machine building industry but also by the aim of acquiring foreign technology—primarily Western—in the shortest possible time. Machinery and equipment is the largest single category in Soviet imports, accounting for more than a third of all imports in

1971. These items are also the most important category among Soviet exports, but these products go primarily to other Communist states or to underdeveloped countries as they are generally not competitive in the developed West.

(1) *Competition between military and civilian production*—The machine building industry is the source of equipment for military-space programs as well as the supplier of producer and consumer durables. In the 1950's, when the output of military hardware was growing rapidly, the competition between military and civilian requirements was particularly strong. This competition has diminished as a result of the vigorous overall growth of the industry and of the economy in general, thus enabling the Soviets to keep the output of military hardware at desired levels while maintaining high growth rates for the production of civilian machinery. As Figure 27 indicates, the growth rates for civilian machinery since 1950 have constantly exceeded those for military machinery. The latter, moreover, has declined as a share in the total output of machinery since 1950 (Figure 28).

Although competition between military and civilian production in the MBMW industry has declined in a quantitative sense, there is still considerable contention between these sectors qualitatively in the sense of competition for the best available resources. With its overriding priority, the military sector has taken and continues to preempt the finest materials and the highest quality facilities and personnel. A case at point is the absorption by military and space programs of the bulk of the computers produced domestically and acquired abroad, leaving the civilian sector with an acute and growing shortage of computers, particularly models incorporating the latest technology. Available evidence indicates that the military sector is almost certainly managed more efficiently, with better coordination and communica-

FIGURE 27. Average annual rates of growth of machine building and metalworking, 1950-71 and 1971-75 plan (S)
(Percent)

| | 1951-60 | 1961-65 | 1966-70 | 1971 | 1971-75 PLAN |
|---|---------|---------|---------|------|-----------------|
| Civilian machinery..... | 11.7 | 9.3 | 9.1 | 10.1 | 13.4 |
| Producer durables..... | 11.2 | 9.3 | 7.9 | 9.5 | 13.4 |
| Consumer durables..... | 15.1 | 9.0 | 15.0 | 12.4 | 13.5 |
| Military machinery and civil space..... | 8.7 | 5.5 | 3.6 | -1.4 | na |

na Data not available.

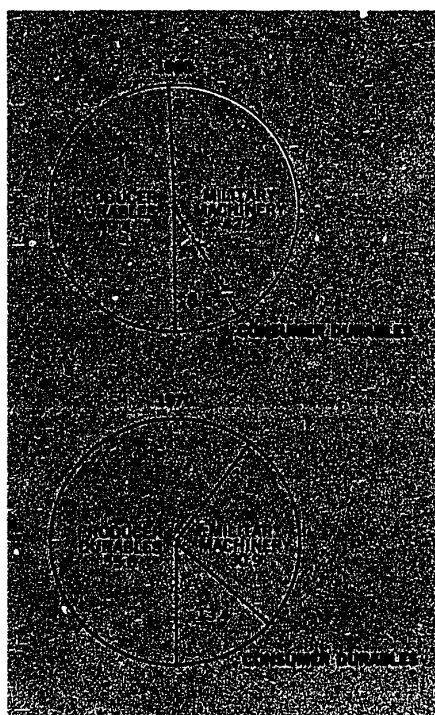


FIGURE 28. Distribution of machinery production, by category (S)

tion among producers and consumers than exists in the civilian sector.

(2) *Defense production*—Between 1962 and 1973, the production of military machinery and equipment increased by about 15%. At the same time, a substantial shift occurred in the mix of defense items within the military machinery category. Research and development (R and D) associated expenditures increased from approximately 28% of total military machinery production in 1963 to 42% in 1972. Missile production, however, fell from 23% of the total in 1963 to 12% in 1972. The share of aircraft and

electronic equipment, which together account for approximately 20% of military machinery production, remained about the same at the beginning and end of the period.

While military programs represent a direct drain on Soviet resources, the defense burden is not as critical as it once was. The share of GNP devoted to defense and space programs has fallen from about 15% in 1950-52 to 6% in recent years. Increased spending on military R and D does have an important impact on economic growth, however. The isolation and secrecy of Soviet military and space R and D as well as production activities largely prevents the flow of new technology and skilled manpower from these programs into the civilian economy. The civilian sector is thereby deprived of skilled engineers needed to introduce more advanced technology in civilian production.

(a) *MISSILES AND SPACE EQUIPMENT*—The Soviets have developed a formidable array of ballistic missiles, aerodynamic cruise missiles, and space equipment since World War II. Beginning with a Soviet version of the 150-nautical-mile German V-2 rocket, the U.S.S.R. has extended the range of its surface-to-surface ballistic missiles to over 7,000 nautical miles for large ICBM's. In 1972 the Soviets began to test several new missiles with improved guidance systems using on-board digital computers. These new systems could provide increased accuracy and make possible the use of multiple independently targetable reentry vehicles (MIRV's) on Soviet ICBM's. The Soviets have also developed and deployed a wide range of other missiles, including several series of surface-to-surface aerodynamic (cruise) missiles, anti-tank guided missiles, air-to-surface missiles, surface-to-air missiles, and air-to-air missiles.

Since the launch of Sputniks I and II in 1957, the U.S.S.R. has developed a number of space vehicles and ancillary systems, although about 60% of all of their launches have been made by the same basic booster—with additional upper stages—which was used to launch the first Sputnik. More than 600 space

launchings have been attempted, ranging from small astrophysical and interplanetary probes through communications and military reconnaissance satellites up to manned space vehicles and large scientific payloads of about 20 tons.

In the missile and space fields, the U.S.S.R. has adopted the same development strategy that characterizes its programs in other fields of production—the use of proven designs, tested production techniques, off-the-shelf hardware when possible, and the application of one design in many roles. All or nearly all of the items that go into production for Soviet missiles and space systems are supplied from domestic sources. Many industries are involved: for example, electronics, machine building, chemical equipment, and optical plants supply components for a missile; metallurgical plants provide metal for the airframe and other components; and the trailer, tractor, and railroad equipment plants make ground support equipment.

(b) **AIRCRAFT**—The aircraft industry is second in size only to that of the United States. A high-priority industry which claims a large investment in facilities for production and research as well as a significant share of the country's engineering and technical personnel, the aircraft industry not only fulfills Soviet military and civilian requirements for aircraft, but provides military and transport aircraft for sale abroad to both Communist and non-Communist countries. Most Soviet airframe and engine plants have some capacity for the manufacture of consumer goods, production of which helps provide stable employment for their labor in an industry noted for its wide fluctuations in output.

As a result of its priority status, the Soviet aircraft industry has no apparent long-range bottlenecks. Its facilities are believed to be sufficiently balanced so that engines and components would be available to support a maximum production effort in the airframe plants. In general, the industry makes use of a fairly narrow range of off-the-shelf engine types to power its military and civil aircraft. A supersonic transport is in production and could be in domestic service by 1975 and international service by 1976.

After a rapid decline in the production of Soviet aircraft in the 1950's, output generally leveled off by the early 1960's. Since 1963 the total annual production has varied between 1,600 and 1,900 aircraft, but there has been a substantial increase in airframe weight. Also, there has been a qualitative change as older model aircraft are phased out and more efficient types with improved capabilities, longer service life, and newer weapons systems enter

production. The estimated production of 1,630 aircraft in 1972 included a few bombers, about 740 fighters, 260 transports, 550 helicopters, with the remaining 75 or so consisting of reconnaissance, anti-submarine warfare and trainer aircraft.

(3) **Civilian production**—The output of major types of capital goods and consumer durables manufactured by the Soviet machine building industry is shown in Figure 29.

(a) **CAPITAL GOODS**—Although the growth in production of most capital goods fluctuates from year to year, certain categories such as chemical equipment and electronic computers have shown consistently higher increases than that for the machine building industry as a whole. The value of production of chemical equipment in 1972 was more than two and one-half times greater than the level in 1960, and the value of output of the instrument industry has been growing at about 13% annually since 1965. In addition, the value of output of the electronics industry, which includes the production of electronic instruments and computers, has been growing at an average annual rate of about 15% since 1965. During the 1960's the manufacturing base of the Soviet electronics industry was transformed from predominantly vacuum tube production to output based on semiconductor technology. Since around 1969, the major effort has been to improve and expand the range of semiconductor devices in series production, and to begin the shift to integrated circuits, the most advanced type of semiconductors. Soviet plans for this industry in the 1970's call for widespread improvements in the quantity and quality of integrated circuits.

The U.S.S.R. is estimated to have produced about 1.5 billion semiconductors in 1972, an increase of 15% over probable output in 1971. More than 95% of the semiconductors produced in 1972 were discrete transistors, diodes, and diode rectifiers; the remaining share consisted of the fastest growing sector of the industry, monolithic integrated circuits and hybrid circuits. Total semiconductor output is expected to grow at an average annual rate of from 10% to 15% throughout most of the 1970's, with microcircuits (particularly monolithic integrated circuits) growing at much higher rates at least through the middle of the decade.

Current levels of output of semiconductors are low because most manufacturing facilities have poor production machinery, inferior material inputs, inadequate cleanliness controls and poor management. All of these factors reduce production yields to levels well below those prevailing in the West.

FIGURE 29. Production of capital goods and consumer durables by the machine building industry (U/OU)

| | 1950 | 1955 | 1960 | 1965 | 1970 | 1971 | 1972 |
|--|-------|-------|-------|-------|-------|-------|--------|
| Capital goods: | | | | | | | |
| Agricultural machinery: | | | | | | | |
| Cultivators (tractor-powered) (thousands of units)..... | 98.9 | 112.6 | 84.8 | 206.3 | 219.2 | 184.1 | *180.0 |
| Grain combines (thousands of units)..... | 46.3 | 48.0 | 59.0 | 85.8 | 99.2 | 102.0 | 95.7 |
| Plows (tractor-powered) (thousands of units)..... | 121.9 | 103.2 | 149.1 | 165.7 | 211.7 | 220.1 | *223.5 |
| Sowing machines (tractor-powered) (thousands of units)..... | 117.7 | 115.4 | 111.9 | 261.7 | 163.5 | 140.6 | *146.5 |
| Chemical equipment (millions of new rubles**)..... | 24.0 | 76.0 | 223.0 | 383.0 | 464.0 | 528.0 | 570 |
| Coal mining equipment: | | | | | | | |
| Coal cutters (thousands of units)..... | 0.9 | 0.4 | 0.4 | 0.2 | 0.1 | 0.1 | na |
| Coal combines (thousands of units)..... | 0.3 | 0.7 | 0.9 | 1.0 | 1.1 | 1.2 | na |
| Construction equipment: | | | | | | | |
| Bulldozers (thousands of units)..... | 3.8 | 7.5 | 12.8 | 20.0 | 33.5 | 38.0 | 40.0 |
| Cranes*** (thousands of units)..... | 5.4 | 9.0 | 10.4 | 15.8 | 21.1 | 21.7 | *22.6 |
| Excavators (thousands of units)..... | 3.5 | 5.2 | 12.6 | 21.6 | 31.0 | 33.2 | 34.9 |
| Electrical and power equipment: | | | | | | | |
| Boilers (thousands of metric tons of steam per hour)..... | 13.0 | 41.1 | 50.3 | 82.1 | | | |
| Generators for turbines (millions of kw.)..... | 0.9 | 4.5 | 7.9 | 14.4 | 10.6 | 12.6 | 13.7 |
| Turbines (millions of kw.)..... | 2.7 | 5.6 | 9.2 | 14.6 | 16.2 | 16.8 | 14.6 |
| Transformers (millions of kv.-a.)..... | 10.2 | 19.7 | 49.4 | 95.3 | 105.9 | 108.1 | na |
| Machine tools: | | | | | | | |
| Metalcutting machine tools (thousands of units)..... | 70.6 | 117.1 | 155.9 | 186.1 | 202.3 | 207.2 | 210.0 |
| Metallurgical machine tools (thousands of units)..... | 7.7 | 17.1 | 29.9 | 34.6 | 41.3 | 42.3 | 43.9 |
| Metallurgical equipment (thousands of metric tons): | | | | | | | |
| Blast furnace equipment (thousands of metric tons)..... | 111.2 | 172.1 | 218.3 | 242.3 | 314.0 | 323.0 | na |
| Rolling mill equipment (thousands of metric tons)..... | 19.4 | 32.4 | 60.9 | 83.9 | 110.8 | 111.4 | na |
| Continuous casting equipment (thousands of metric tons)..... | 66.1 | 108.5 | 120.6 | 111.2 | 140.1 | 140.7 | na |
| Steel smelting equipment (thousands of metric tons)..... | | | | 10.0 | 12.4 | 16.4 | na |
| Petroleum refinery equipment (thousands of metric tons)..... | 25.7 | 31.2 | 36.8 | 37.2 | 50.7 | 54.5 | na |
| Rolling stock: | 47.9 | 48.8 | 93.0 | 139.7 | 126.6 | 138.3 | 157.0 |
| Mainline freight cars (thousands of units)..... | 50.8 | 34.4 | 36.4 | 39.6 | 58.3 | 63.7 | 68.9 |
| Mainline locomotives (thousands of units)..... | 1.2 | 1.0 | 1.7 | 2.1 | 1.8 | 1.8 | 1.8 |
| Tractors, crawler and wheeled (thousands of units)..... | 116.7 | 163.4 | 238.5 | 354.5 | 458.5 | 472.0 | 477.8 |
| Trucks (thousands of units)..... | 294.4 | 328.1 | 362.0 | 379.6 | 524.5 | 564.2 | 598.0 |
| Durable consumer goods: | | | | | | | |
| Passenger cars (thousands of units)..... | 64.6 | 107.8 | 138.8 | 201.2 | 344.2 | 529.0 | 730.0 |
| Radios (millions of units)..... | 1.1 | 3.5 | 4.2 | 5.2 | 7.8 | 8.8 | 8.8 |
| Refrigerators (millions of units)..... | Insig | 0.2 | 0.5 | 1.7 | 4.1 | 4.6 | 5.0 |
| Sewing machines (millions of units)..... | 0.5 | 1.6 | 3.1 | 0.8 | 1.4 | 1.4 | na |
| Electric ranges (millions of units)..... | 1.7 | 4.6 | 6.9 | 6.1 | 9.8 | 10.9 | na |
| Television sets (millions of units)..... | Insig | 0.5 | 1.7 | 3.7 | 6.7 | 5.8 | 6.0 |
| Washing machines (electric) (millions of units)..... | Insig | Insig | 0.9 | 3.4 | 5.2 | 4.1 | 3.0 |

na Data not available.

*Preliminary estimates.

**Entries for 1950-65 are in 1955 prices, for 1970-72 in 1967 prices.

***Includes truck cranes, cranes mounted on pneumatic tires, and tower cranes.

Moreover, since most Soviet microcircuits now in series production are relatively simple by Western standards, the industry's production problems make it increasingly difficult to introduce more technologically advanced devices into series production. The Soviets are increasing their efforts to acquire Western assistance in order to seek a quick and an efficient solution to these difficulties. Should U.S. export controls over microcircuit production technology and machinery be relaxed, the U.S.S.R. probably would import substantial quantities of this technology and

machinery over the next several years. Based on recent Soviet inquiries, these orders could easily top \$70 million during 1973-75.

Soviet production of computers in 1972 amounted to about 1,300 units compared with more than 20,000 in the United States. As of mid-1973, the U.S.S.R. had about 8,500 digital computers in operation compared with more than 100,000 in the United States. Moreover, most Soviet computers currently in production are fitted with obsolescent transistors, and initial serial production of third-generation models,

using integrated circuits, began only recently. The electronics industry is still unable to supply computer producers with high-quality integrated circuits needed for the mass production of third-generation computers.

Compared with Western counterparts, the productivity of Soviet computers is low, and the large divergence in characteristics among models reduces the possibilities for using standard programs. Furthermore, the large amount of handcrafting used in both production and assembly of Soviet computers means that machines of the same model often differ enough in circuitry that they cannot use the same programs. Documentation needed to operate and maintain Soviet computers generally is inadequate and unreliable, and Soviet computer producers provide their customers with little software, training, and maintenance support. Soviet computers also are frequently out of service because of component failure or breakdown of peripheral equipment. The industry is short of modern production equipment and has a low standard of quality control.

Plans were laid in 1964 to manufacture two families of third-generation computers, the RYAD (data processing) and ASVT (process control) series. This program is about 3 years behind schedule, partially because the Soviets have not been able to develop their own production technology. As a result, the U.S.S.R. is trying to acquire this technology in the developed West, with special efforts directed toward acquiring integrated circuit and computer disc memory technology. Export controls have so far denied the U.S.S.R. access to this technology, without which it is unlikely that the Soviets can produce the number of more advanced computers projected during the current plan period. Such computers, moreover, will be based on technology developed in the United States during the mid-1960's.

There have been substantial problems in the chemical machine building sector arising from the lack of technical know-how and the "crash" basis on which this industry has been expected to produce. The planned product mix has not been forthcoming, the quality of output frequently has been inferior, and difficulties have been encountered in the manufacture of custom equipment. Availability of corrosion-resistant metals required for fabrication of equipment has also been a problem. To alleviate these shortcomings the Soviets have been buying substantial quantities of chemical equipment from the West and from East Europe in recent years.

The power equipment industry has substantially increased its output of turbines, generators for

turbines, and transformers. Manufacturing methods and techniques for producing electric power equipment generally are similar to those used in the United States and other highly industrialized countries. The U.S.S.R. has lagged behind the United States in the technology for producing thermal-electric power equipment, especially high-temperature and high-pressure equipment. In the fields of hydroelectric generating equipment and high-voltage transmission equipment, however, the U.S.S.R. has developed the most advanced technology in the world.

The output of petroleum refinery equipment on a weight basis has increased irregularly since 1960, with record output in 1965 not exceeded until 1972. Production plans have been consistently underfulfilled in recent years. Some of the larger Soviet units are technically inefficient, and a shortage persists of the more modern, secondary processing units needed to improve product quality. During 1968-71, imports of refinery equipment—primarily secondary units from the industrialized West and East Europe—rose to record levels of \$35 million to \$45 million annually as such equipment could not be produced by domestic plants in adequate amounts.

In 1972 the construction equipment industry nearly tripled the output of bulldozers and excavators since 1960. The U.S.S.R. ranks second only to the United States in world production of construction equipment, and it produces more than all other Communist countries combined. The industry, however, generally fails to meet the needs of Soviet construction in terms of quantity, quality, and product mix. Much of the equipment is underpowered relative to its weight and is susceptible to frequent breakdowns.

The Soviet machine tool industry is oriented toward serial and mass production of standardized general-purpose machines. Although growth of production has leveled off, the U.S.S.R. still produces larger numbers of these units than the machine tool industry of any other country—210,000 metalcutting machine tools and 43,900 metalforming machine tools in 1972. However, the U.S.S.R. still lags far behind the industrialized West in the development and production of specialized machine tools, such as numerically controlled machining centers and automatic transfer lines.

The priority position enjoyed by Soviet machine tool builders stems from the major role they play in expanding the nation's industrial production, both civilian and military, and the importance of machine tools in keeping operational the vast stocks of machinery and equipment in the transportation, agricultural, industrial, and military sectors of the

economy. The U.S.S.R. is a net importer of machine tools, with an increasing share of imports consisting of expensive, high-precision, and specialized machine tools that often embody advanced Western technology. Soviet exports consist of relatively inexpensive, general-purpose machine tools.

(b) SHIPBUILDING—The U.S.S.R. is one of the major shipbuilding nations of the world. During 1962-71 the Soviets completed about 270,000 full load displacement tons of major surface combatant ships and about 586,000 surface displacement tons of submarines. In addition, the Soviet shipyards completed approximately 4,323,000 deadweight tons (d.w.t.) of merchant ships during this decade (Figure 30). They also imported a large volume of tonnage from other Communist countries and non-Communist nations. Of the nearly 7 million tons imported during 1962-71, three-fifths came from other Communist countries, notably Poland, East Germany, and Yugoslavia. Finland, France, and Sweden were the chief non-Communist suppliers of merchant ships.

While most of the ships built in the U.S.S.R. are for the Soviet naval and merchant fleets, an increasing amount of tonnage is exported. For example, in 1965 the Soviets sold only two merchant ships abroad. During the 1965-69 period, the Soviets exported merchant ships totaling 545,000 d.w.t., but in 1970-71 they built and exported 487,000 d.w.t. These ships have been built for other Communist countries (East Germany, Bulgaria, Romania, and Cuba), and for non-Communist states, including West Germany, Norway, Sweden, Belgium, and Portugal. In 1970 the export of 203,000 d.w.t. represented 40% of total merchant tonnage built in the U.S.S.R.; the 284,000

d.w.t. sold abroad in 1971 was 46% of the total built in that year.

Cargo ships, tankers, and fishing ships accounted for the bulk of Soviet merchant shipbuilding tonnage built during 1962-71. Half of this tonnage consisted of cargo ships, 30% were tankers, and 18% were fishing ships. The remaining 2% consisted of passenger ships, tugs, icebreakers, and other specialized vessels.

The continued planned growth of the U.S.S.R.'s merchant fleet probably will keep steady demands on Soviet shipyards for new construction. In addition to the standard cargo and tanker ships built in the past, more specialized types are projected such as container ships, supertankers, and roll-on, roll-off ships. The demands for new merchant ships and the apparent trend in exports, combined with the high priority given to naval shipbuilding, suggests that Soviet shipbuilding will continue the rapid development of the past decade.

(c) CIVILIAN MOTOR VEHICLES—Since 1965 the U.S.S.R. has been modernizing and expanding its automotive industry, which has lagged far behind Western industries in output, vehicle design, and production technology. Despite sizable gains, Soviet passenger car production of 730,000 units in 1972 was only 9% of the 8.3 million produced in the United States; in that year there was 1 passenger car per 103 persons in the U.S.S.R. compared with 1 car for each 2.2 persons in the United States. Nearly half of the Soviet motor vehicles produced in 1972 were trucks and buses (649,000 units), whereas about 80% of the vehicles built in the United States are passenger cars.

Soviet plans for 1966-70 and 1971-75 have stressed the expansion of passenger car production. Output of

FIGURE 30. Merchant shipbuilding by and for the U.S.S.R., 1962-71 (S)
(Ships built)

| TYPE OF VESSEL | IN U.S.S.R. | | IN OTHER COMMUNIST COUNTRIES | | IN NON-COMMUNIST COUNTRIES | | TOTAL | |
|----------------|----------------|--------------------------|------------------------------|--------------------------|----------------------------|--------------------------|----------------|--------------------------|
| | No. of vessels | Thousand deadweight tons | No. of vessels | Thousand deadweight tons | No. of vessels | Thousand deadweight tons | No. of vessels | Thousand deadweight tons |
| Dry cargo..... | 289 | 2,180 | 372 | 2,696 | 132 | 873 | 793 | 5,749 |
| Tanker..... | 68 | 1,294 | 65 | 853 | 77 | 1,070 | 210 | 3,217 |
| Passenger..... | 8 | 8 | 25 | 38 | na | na | 33 | 46 |
| Fishing..... | 456 | 781 | 305 | 694 | 87 | 601 | 848 | 2,076 |
| Other*..... | 22 | 60 | 19 | 19 | 29 | 45 | 70 | 124 |
| Total..... | 843 | 4,323 | 786 | 4,300 | 325 | 2,589 | 1,954 | 11,212 |

na Data not available.

*Includes salvage tugs, icebreakers, cable layers, training ships, hydrographic ships, and dredgers.

cars is to total 1.26 million by 1975, with half of this amount to come from the new Volga Motor Vehicle Plant at Tol'yatti, built under contract with Fiat. In 1967 the Soviets also began to build up the truck industry by speeding up the remodeling of their major truck plants and by starting construction of a large new plant on the Kama River. This complex for building heavy diesel trucks is scheduled for completion in 1974, but it is roughly 2 years behind schedule.

Although the automotive industry failed to meet either its original or revised 5-year goals for cars and trucks during 1966-70, the more realistic production targets in the 1971-75 period are being met in large part. By 1975 the industry is scheduled to build 2.1 million vehicles—1.26 million cars, 765,000 trucks, and 75,000 buses. In 1972 the industry turned out nearly 1.4 million vehicles—730,000 cars, 597,000 trucks, and 52,000 buses—or two-thirds of the 1975 target.

Passenger cars have always been scarce in the U.S.S.R., but they are becoming more plentiful and increasing numbers are privately owned. By 1975 the U.S.S.R. will have an inventory of nearly 5 million passenger cars, two-thirds of which will be allocated to private citizens. As retail prices are extremely high, cars can be afforded only by those with high incomes or substantial savings. Service facilities, woefully inadequate at present, are being expanded but not rapidly enough to keep pace with the growing output of cars and other motor vehicles.

Despite extensive unsatisfied demand at home, the U.S.S.R. exports about one-fifth of its car output; some 150,000 cars were exported in 1971, 86% of which went to East Europe. The U.S.S.R. exports less than 20,000 cars a year to non-Communist countries but plans to expand such sales, particularly in Western Europe. Both exports and imports of trucks are small in relation to production.

The U.S.S.R. traditionally has supplied most of the raw materials required by its motor vehicle industry from domestic sources, but the growing output of passenger cars and trucks is beginning to strain supplies of certain materials. For example, the U.S.S.R. cannot produce enough body steel and rubber, and must buy these materials in the West. The industry imports steel from West Germany, the United States, etc., and rubber products, particularly tires, from Italy. The U.S.S.R. also began the large-scale import of automotive parts from East Europe in 1970 to supply the Volga plant. The industry also imports East European technology and components for building trucks and buses. Most of the imported

automotive components are paid for in finished motor vehicles.

Although the Soviet motor vehicle industry has attained a high degree of mechanization, many of the machine tools in service are worn or obsolescent. Automation is less advanced than in the West, but new automatic transfer machine tool lines built in the West are being added at major plants, principally for the manufacture of engine blocks and other engine parts. The U.S.S.R. also is importing the production technology and equipment for making axles and transmissions. The state of technology in the industry has been advanced by the construction of the Volga plant under the Fiat contract and by expansion of production facilities for the Moskvich automobile under contract with Renault. Both facilities embody Western production technology and equipment, including gear-cutting machines and crankshaft grinders from the United States. The U.S.S.R. now is concentrating on building the Kama Truck Complex, which also will be outfitted in large part with non-Communist equipment and technology. The Kama foundry, in particular, represents a major technological gain for the U.S.S.R. Designed and built in the United States, the foundry embodies advanced process technology and equipment that the U.S.S.R. has sought to buy for several years.

c. Chemicals and allied products (S)

The Soviet chemical industry is the second largest in the world, or more than one-third the size of its U.S. counterpart. Large reserves of important chemical raw materials such as salt, limestone, petroleum, phosphate, potassium, and sulfur-bearing ores provide a strong base for the industry's development. Although production of chemicals has been growing rapidly, overall progress has been impeded by lags in the introduction and assimilation of modern chemical technology. Nevertheless, the U.S.S.R. is making a major effort to overcome these shortcomings and to catch up with the leading non-Communist countries in the production and application of a wide range of new chemical products. This effort involves not only the acquisition of advanced chemical technology and equipment for production of petrochemicals and complex products, such as synthetic fibers and multinutrient fertilizers, but also a significant expansion in the production of such basic chemicals as sulfuric acid and ammonia.

Following a period of relative neglect in the 1950's, substantial funds were allocated in the later Khrushchev years to accelerate development of the Soviet chemical industry. Productive fixed capital of

FIGURE 31. Production of basic chemicals and allied products (S)
(Thousands of metric tons)

| | 1950 | 1960 | 1965 | 1970 | 1971 | 1972* |
|-----------------------------|-------|--------|--------|--------|--------|--------|
| Caustic soda (100%)..... | 299 | 704 | 1,199 | 1,783 | 1,866 | 1,899 |
| Chemical fibers..... | 24 | 211 | 407 | 623 | 676 | 746 |
| Chlorine**..... | 187 | 496 | 833 | 1,344 | 1,416 | 1,445 |
| Mineral fertilizers***..... | 5,497 | 13,867 | 31,253 | 55,400 | 61,398 | 66,100 |
| Nitric acid (100%)**..... | 892 | 2,417 | 4,300 | 7,061 | 7,500 | na |
| Plastics..... | 67 | 312 | 803 | 1,673 | 1,862 | 2,035 |
| Soda ash (100%)..... | 711 | 1,793 | 2,727 | 3,485 | 3,629 | 3,850 |
| Sulfuric acid (100%)..... | 2,125 | 5,398 | 8,518 | 12,059 | 12,775 | 13,700 |
| Synthetic rubber**..... | 144 | 347 | 604 | 914 | 1,000 | 1,060 |

na Data not available.

*Preliminary.

**Estimated.

***Fertilizer quantities are expressed in terms of fertilizer containing the following nutrients:
20.5% N.; 41.6% K₂O; 18.7% P₂O₅.

the industry in 1970 was more than 4 times the level of 1960, and per capita output of chemicals tripled during the same period. The share of the chemical industry in total industrial output rose from 3.7% in 1960 to 5.7% in 1970. Data on production of selected chemicals and allied products are shown in Figure 31. Despite substantial increases in production, delays in construction and difficulties in bringing new plants up to rated capacity prevented realization of goals for major chemical products during the Seven Year Plan (1959-65) and the Eighth Five Year Plan (1966-70). Shortfalls were particularly evident in fertilizers, plastics, synthetic rubber and man-made fibers. In addition to retarding the industry's rate of growth, the lag in commissioning modern facilities has adversely affected the efficiency of the chemical industry and the quality of its products.

Under terms of the Ninth Five Year Plan (1971-75) chemical output is scheduled to rise by 72% and represent 6.7% of total industrial output in 1975, or a full percentage point more than in 1970. Investment in the chemical and petrochemical industry is to be increased by 91% compared with similar investment during 1966-70. Progress of the industry, however, still is hindered by lack of know-how and experience in chemical engineering, a shortage of skilled personnel, and the inability of the machine-building industry to provide equipment that fully satisfies requirements for product mix and quality. To help offset these shortcomings, the Soviets are relying on large purchases of equipment from the West and increased cooperation with East Europe in the development and production of chemicals and chemical equipment. Growth of the Soviet chemical industry is likely to retain a fairly high priority because of the heavy

dependence of modern industrial and agricultural technology on the wide range of chemicals developed since World War II.

The U.S.S.R. imports man-made fibers, plastics, and synthetic rubber, together with intermediates for their production. In addition, large quantities of natural rubber, paints and lacquers, pharmaceuticals, and pesticides are purchased abroad. Important chemical exports include fertilizers, raw materials for fertilizers and plastics, coke chemicals, synthetic rubber, and rubber products. On a value basis, trade in chemicals, rubber, and allied products (including pharmaceuticals, man-made fibers, and essential oils) amounted to more than \$1.6 billion in 1971. Imports exceeded exports by more than \$500 million, with pharmaceuticals and natural rubber the major items bought abroad.

The Soviets claim that gross chemical output, originally scheduled to double during 1966-70, increased by only 78% (or about 56% on the basis of Western estimates of production). Nevertheless, growth rates for chemicals remained well above those for total industrial output, and despite the shortfall in plans, substantial increases were made in the production of fertilizers, plastics, and a number of other products. In 1971, gross chemical output exceeded the plan, increasing by more than 10%, but continuing problems with construction, poor-quality equipment, and inadequately skilled workers resulted in a shortfall in 1972 as production rose by 9% instead of the planned level of 10.5%. Moreover, a reduction in scheduled growth of chemical output in 1973 from 10.7% to 8.5% indicates that the cumulative delays in recent years have been serious. A major effort to regain lost ground is evident, however, in the plan to increase

investment in the chemical industry by 40% in 1973. Centers of chemical production are shown on the Summary Map foldout at the end of this chapter.

Sulfuric acid is produced at about 90 installations in the U.S.S.R., but output is not always sufficient to meet requirements, particularly those of the phosphate fertilizer industry. Production of sulfuric acid in 1970 was considerably below the amount scheduled for that year in the original plan for 1966-70. The target for 1975 is almost 20 million tons, and plans include the adoption of improved production processes and increases in the productivity of future units. Poland has contracted to supply the U.S.S.R. with several sulfuric acid installations with unit capacities of 360,000 tons and 500,000 tons per year.

Soviet technology for the production of ammonia lags behind that used in modern Western plants; plans for 1971-75 call for the construction of installations with unit capacities of 400,000 to 500,000 tons per year based on more efficient designs and equipment. Domestic development of such units has been lagging, however, and in 1969-71 the U.S.S.R. contracted with Japanese firms to supply five complete ammonia plants, each with a production capacity of 450,000 tons per year, and major equipment for four other plants. In addition, Czechoslovakia is to supply the U.S.S.R. with seven high-pressure reactors for the synthesis of ammonia. Soviet output of ammonia, which doubled during 1966-70 but still fell short of plan, is scheduled to rise by about 55% during 1971-75. Production of nitric acid also continues to expand to meet the rising needs of the fertilizer industry.

The manufacture of fertilizers is a high priority task of the Soviet chemical industry. Plans initially called for production of fertilizer to double during 1966-70 to 62-65 million tons⁷ per year, but actual output in 1970 amounted to only 55.4 million tons, equivalent to 13.1 million tons of fertilizer nutrients. In addition to the delays experienced in increasing output, the Soviet chemical industry has been slow to improve the product mix and the quality of fertilizers. Production is heavily weighted with single-nutrient fertilizers, while the more efficient complex or multinutrient types common in the West accounted in 1970 for only about 5% of total Soviet fertilizer output. Production of fertilizer is scheduled to increase to 90 million tons in 1975, based in part on foreign technology and equipment. To this end the Soviets have bought complex fertilizer plants in the West, and Czechoslovakia has contracted to supply three large urea

⁷Expressed in terms of Soviet "standard" fertilizer. The 62 million to 65 million tons would be roughly equivalent to 14 million to 15 million tons of fertilizer nutrients.

fertilizer plants as well as a superphosphate plant, the latter a joint project with Poland and East Germany. Output of fertilizer in 1971 and 1972 was slightly above the targets for those years, but construction of new capacity during 1968-72 was behind schedule, and investment in this area in 1973 is to be increased by 80%.

Soviet output of plastics in 1972 was less than one-fifth of that in the United States. An ambitious program to produce more than 2 million tons by 1970 had to be abandoned, although actual output in that year was double the 1965 level. Manufacturing techniques and the assortment and quality of Soviet plastics have been generally inferior to those in the developed West. As in other sectors of the industry, the Soviets import both finished plastics and materials used in their production to compensate for inadequacies in domestic production. Process technology and a number of complete plastics plants also have been purchased in non-Communist countries to achieve a greater degree of self-sufficiency. Production of plastics is scheduled to more than double in 1971-75; although output in 1971 and 1972 was slightly above the targeted levels, the largest increases are to come in 1974 and 1975.

The U.S.S.R. ranks second in the world in the production of synthetic rubber, yet output is only about two-fifths of that in the United States. Confronted by increasing demands for rubber, and handicapped by a synthetic rubber industry that has failed to keep pace with these demands, the country has been forced to import sizable quantities of natural rubber, primarily from Malaysia. Soviet imports of natural rubber from all areas averaged 305,000 tons per year during 1966-70, but purchases abroad in 1971 fell to 241,000 tons.

Soviet plans initially called for production of synthetic rubber to rise by 120% during 1966-70. Largely because of delays in development and commercialization of new types of synthetic rubber, however, output increased by only slightly more than 50%. Most of the growth in production during 1966-70 resulted from increases in production of two relatively new types of synthetic rubber, polyisoprene and polybutadiene; their share in total Soviet production of synthetic rubber rose from 4% in 1965 to 33% in 1970. More than one-third of the U.S.S.R.'s synthetic rubber produced in 1970 was made by an obsolete process using ethyl alcohol. Modernization of the industry is scheduled to continue during 1971-75 with synthetic rubber output planned to increase by 70%.

About three-fourths of the synthetic rubber made in the U.S.S.R. goes for the production of tires and

technical rubber goods. Although steadily improving throughout the 1960's, the quality of these products still lags behind that of the developed West. Soviet efforts to reduce this lag include the use of improved types of rubber, cord, and carbon black, and the increased production of radial tires.

Soviet production of man-made fibers (cellulosic and synthetic) in 1972 amounted to about 7.5% of world output and one-fourth of that in the United States. Synthetic fibers (nylon, acrylics, polyesters) represented only 30% of the total Soviet output of man-made fibers in 1971, whereas such fibers accounted for three-fourths of the U.S. product mix. Although Soviet production of these fibers is growing fairly rapidly, substantial shortfalls in production targets were experienced during 1966-70. Output in 1970, for example, was only 77% of the amount called for in the original goal for 1966-70. The quality of some Soviet man-made fibers, moreover, is very poor by U.S. standards, in part reflecting the use of inferior raw materials. In addition, the assortment is not adequate to provide for the needs of the textile industry. To compensate for their lagging technology, the Soviets have purchased plants and technology from non-Communist countries for the production of polyester and acrylic fibers, and of associated intermediates. The U.S.S.R. is seeking additional equipment from the West to support the planned increase of 71% in production of man-made fibers during 1971-75.

d. Textiles and wearing apparel (U/OU)

(1) *General*—The output of light industry (textiles and wearing apparel) has increased appreciably in recent years, but the assortment and quality of output still remain low by Western standards and fail to meet the increasingly exacting demands of the Soviet consumer. The first half of the 1960's was characterized by severe inventory accumulation problems as consumer resistance to the clothing and fabrics offered rose markedly. Various measures such as price reductions, removal of the rural-urban price differential (which favored urban areas), and the 1965 reform (see B, 2) were successful in the short run in moving certain soft goods, but the basic maladjustments remained. As of the early 1970's the consumer still could not find the variety, assortment, and quality he desired, and inventories of textiles, clothing, and shoes were again growing more rapidly than sales.

The major share of Soviet soft goods is produced in large, centrally directed plants which generally use mass production methods. Some items, however,

continue to be produced on a small scale by local industry, which includes many industrial cooperative enterprises that operated outside the state sector of the economy until 1960. Using local materials and scrap from large-scale industry, local industrial plants produce a wide variety of goods in limited quantities, mainly for local needs.

A great deal of labor is used in light industry because technological innovation has been slow in development, and even more tardy in its application. Not only is Soviet light industry deficient in the degree of its mechanization, but machinery in use throughout the industry is overage; the technology of Soviet textile mill equipment is generally 25 or 30 years behind that employed in the United States. As a result, even in the textile industry, which is more highly mechanized than the clothing and footwear industries, many more workers are used for given operations than in the United States.

Despite the U.S.S.R.'s backwardness in this area, Soviet machinery designers and manufacturers have been slow to respond to the needs of the sector for more efficient and sophisticated equipment. To speed the modernization of its plant and equipment, the country has turned to Western countries for advanced machinery and manufacturing processes.

(2) *Production*—The output of textiles and of major items of wearing apparel has grown steadily since 1955 (Figure 32). The textile industry, by far the largest single component of light industry, is dominated by cotton fabrics, which accounted for 70% of total textile production in 1972. In the same year the production of cloth from chemical fibers and natural silk ranked second to cotton cloth in volume but accounted for only 14% of total textile production in 1972. In the same year the production of cloth from chemical fibers and natural silk ranked second to cotton cloth in volume but accounted for only 14% of total production. In 1972, woolen cloth accounted for 7% of textile output, with the remainder consisting of linen, jute, and hemp fabrics.

Production of footwear has increased significantly since 1955, but output consistently lags behind demand as the industry suffers from an inadequate supply of domestic leather, textile materials, and artificial and synthetic leathers used in the manufacture of shoes. Consequently, the U.S.S.R. is a net importer of finished footwear, tanned leather, raw hides and skins, and artificial leather. As with textiles, a substantial part of all work in the manufacture of shoes in the Soviet Union is manual, whereas the footwear industries of the industrial West are highly

FIGURE 32. Production of textiles and wearing apparel (U/OU)

| | 1955 | 1960 | 1965 | 1970 | 1971 | 1972* |
|--|-------|-------|-------|-------|-------|-------|
| Textiles: | | | | | | |
| Cotton (billions of square meters)..... | 4.227 | 4.838 | 5.499 | 6.152 | 6.397 | 6.419 |
| Wool (billions of square meters)..... | 0.316 | 0.439 | 0.466 | 0.643 | 0.675 | 0.681 |
| Linen (billions of square meters)..... | 0.272 | 0.516 | 0.548 | 0.707 | 0.760 | 0.775 |
| Other (billions of square meters)**..... | 0.532 | 0.843 | 0.959 | 1.272 | 1.323 | na |
| Wearing apparel: | | | | | | |
| Knitted outerwear (millions of pieces)..... | 85 | 112 | 188 | 415 | 445 | 447 |
| Knitted underwear (millions of pieces)..... | 347 | 472 | 718 | 821 | 830 | 843 |
| Hosiery (millions of pairs)..... | 772 | 964 | 1,350 | 1,338 | 1,309 | na |
| Sewn garments (billions of new rubles)***..... | na | 8.7 | 9.2 | 16 | 17 | 17.3 |
| Leather footwear (millions of pairs)..... | 271 | 419 | 486 | 676 | 679 | 645 |

*Preliminary data.

**Silk, synthetic, jute, and hemp fabrics.

***1960, 1965 in 1955 wholesale enterprises; 1970-72 in 1967 wholesale enterprise prices.

mechanized. By Western standards, Soviet footwear is of inferior quality with respect to materials and details of construction.

Although Soviet foreign trade in textiles, wearing apparel, and footwear is increasing, it is small compared with domestic production. In 1971 net imports by value of textiles and wearing apparel amounted to more than \$1.4 billion, of which nearly one-fourth was leather footwear.

e. Food processing (U/OU)

(1) *Procurement and distribution*—Most of the raw material for the several food industries is supplied through the Ministry of Procurement, which purchases major products from state and collective farms at centrally determined prices according to a general schedule established by the State Planning Committee. Until 1965 these prices generally did not cover production costs, but in March of that year procurement prices were raised to reflect more adequately the real costs of farm production. Since 1965, moreover, there have been several other procurement price revisions designed to spur production.

The supply of agricultural products to the food processing industries frequently is erratic because the procurement agencies fail to organize a smooth and efficient distribution of farm products to the plants within their jurisdiction. Food industry plants, forced to operate under the handicap of an irregular supply, experience spoilage and down times far higher than would be acceptable in Western countries. The central press is replete with stories of canning plants, for example, that are idle for as long as 3 weeks in the course of a month and then unable to handle the

quantities of foodstuffs received during the fourth week. As they usually lack adequate storage capacity, the plants are unable to hold farm products in good condition and thus smooth out the cycle. In extreme cases, plants have been known to refuse deliveries rather than bear the onus for spoilage, rotting, and other forms of waste. In mid-1972, for example, when processed meat supplies in a number of provincial cities were limited, slaughter houses were refusing animals because they had no storage capacity. In general, processing facilities for most agricultural products are insufficient, and storage, transport, and refrigeration facilities, though expanding, are far from adequate.

(2) *Production*—In terms of quality, variety, and packaging, the food industries lag far behind that of the United States and Western Europe. Industrially processed meat and canned goods are of particularly low quality; industrially processed milk, butter, vegetable oil, and margarine are still largely retailed in bulk form. Few foods are prepackaged, and those that are precooked or frozen are almost unknown to the Soviet consumer; a considerable portion of these prepared products are imported.

The growth of output of the Soviet food industries depends primarily on the level of domestic farm production augmented by the fish catch and by imports of certain raw agricultural products such as sugar. In addition, the continuing shift from home processing to industrial processing has stimulated growth in the food industries. This has been particularly true in the case of meat; the share of total output accounted for by industrial processing rose from 40% of total production in 1955 to 64% in 1972. The industrial production of other commodities has

followed a similar pattern of change, as illustrated in the following tabulation showing industrial processing as a percent of total production of selected food products:

| YEAR | MEAT | MILK PRODUCTS | BUTTER | FLOUR |
|------------|------|------------------|--------|-------|
| 1950 | 37 | 32 | 70 | 65 |
| 1955 | 40 | 40 | 81 | 81* |
| 1960 | 51 | 48 | 87 | 90 |
| 1965 | 52 | 58 | 91 | 95 |
| 1970 | 58 | 60 | 90 | 99 |
| 1971 | 62 | 61 | 91 | 99 |
| 1972 | 64 | 63 | 92 | 100 |

*Estimated.

As might be expected, shortfalls in farm output have a pronounced effect on processed food output, particularly in the production of vegetable oil, sugar, dairy products, and canned goods. Although the full impact of the poor 1972 harvest had not been fully felt throughout the processed food sector by the end of the year, growth in output slowed from an annual average of nearly 5% during 1966-71 to just over 2% in 1972. The exhaustion of possibilities for further growth through the substitution of industrial processing for home processing of products such as butter and flour is a decelerating factor in the overall growth of the food industries. To some extent, however, this development is offset by increased agricultural output and by improved types of processing. For example, the production of frozen vegetables began in the late 1960's and there have been marked improvements via increased or new processing of confectionary products, fruits, cheese, flour, and bread.

5. Construction and construction materials (U/OU)

a. Construction

Following a period of extremely rapid growth during 1956-60, when the average annual rate of increase in the volume of construction was about 13%, a pronounced slowdown occurred during the 1960's. The average annual rate of growth during this decade was about one-half as great, but it picked up again to almost 9% in 1971. The construction portion of capital investment in that year was about 17% of Soviet GNP and 62% of total Soviet investment, including assembly and installation work.

In 1971, 84% of total construction was contracted out to building enterprises. The remainder was performed by individuals building private houses and by enterprises and collective farms using their own

employees. In the case of individuals building private housing, little of the work is done by organized contract builders, but most of the actual construction is carried out under informal contracts with workers from these organizations.

Soviet leaders have consistently approved excessively long lists of construction projects in their national economic plans. This has spread thin construction resources and extended the time required to complete projects. In the late 1960's, for example, the Construction Bank calculated that the average duration of industrial construction was 5.3 years, or 1.5 to 2 times longer than Soviet norms for such activity. As a result, the amount of unfinished construction, or the value of work done on buildings and other structures that are still incomplete and not available for use, continues to increase at a rapid rate. On an average annual rate of increase, this figure rose by 6.7% during 1961-65 to 12.1% in 1966-70 before declining to 10.3% in 1971. In that year the amount of unfinished construction (excluding collective farm construction and individual housing) reached 57.9 billion rubles, or almost three-fourths of all capital investment for 1971. Currently, the Soviet leaders are again attempting to reduce the volume of unfinished construction by restricting the number of new projects started.

Poor planning and design, delays in the completion of construction projects, and the slow introduction of new technology have made some installations relatively obsolete before they begin operating or reach design capacity. In addition, the typical year-end rush to complete the construction plan contributes to poor quality because the builders are generally fatigued and lack time to do a good job, climatic conditions are unfavorable, and government commissions accept incomplete or poorly finished structures to fulfill their construction plans. The system thus rewards gross volume of construction rather than the quality of workmanship or actual completion of projects.

Military construction organizations in the U.S.S.R. are primarily engaged in building military camps and service facilities as well as certain civilian projects. In general, military construction personnel are not highly skilled, with the result that even strictly military projects such as missile launch facilities are usually built by civilian construction organizations.

There are seven all-union or union-republic ministries specifically engaged in building activities plus a number of ministries and other organizations that are also involved in construction (Figure 33). Despite the specialization implied by the titles of the

FIGURE 33. Percentage of contract construction fulfilled by major construction organizations in 1970 (U/OU)

| ORGANIZATION | PERCENT |
|--|---------|
| Ministry of Installation and Special Construction Work..... | 14 |
| Ministry of Construction of Enterprises in Heavy Industry..... | 13 |
| Ministry of Industrial Construction..... | 12 |
| Ministry of Power and Electrification..... | 10 |
| Ministry of Construction..... | 9 |
| Ministry of Rural Construction..... | 8 |
| Ministry of Transport Construction..... | 6 |
| Ministry of Gas Industry*..... | 4 |
| Other organizations (Residual)**..... | 24 |

*Construction in this industry is now the responsibility of the Ministry of Construction of Enterprises of the Oil and Gas Industry, established in September 1972.

**These include urban chief directorates of construction, the Ministry of Reclamation and Irrigation, collective farm construction organizations, and probably military construction organizations.

construction ministries, there is considerable overlapping of functions and responsibilities. The most recently established construction ministry—The Ministry of Construction of Enterprises in the Oil and Gas Industry, founded in September 1972—attests to the importance the Soviets place on bringing enterprises in these sectors on stream rapidly. The U.S.S.R. will need increasing amounts of fuels to meet its growing domestic requirements and to be channeled into exports to pay for its rising imports, particularly from hard currency areas.

During the period 1962-71, average annual investment in housing construction increased at a fairly uniform rate of 3.8%, from approximately 9.7 billion rubles in 1962 to 14.1 billion in 1971. This increased investment, however, did not result in more housing units because it was accompanied by a rise in the cost per square meter of housing constructed and by an increase in the average apartment size; these two trends completely absorbed the increased investment. A more significant indicator of the low priority accorded housing construction is the percentage of capital investment allocated from this purpose, a share that fell from about 22% to 16% of the total during 1962-71.

b. Construction materials

The Soviet concept of the "industrialization of construction" means 1) standardized designs are used throughout the country, especially in service-oriented types of structures such as apartments and schools, and 2) some of the construction is shifted back from the

building site to the factory by the fabrication of components using precast concrete methods. The Soviet Union is the world's largest cement producer to meet its growing demand for precast concrete. Conversely, there has been a relative decline in the use of brick as a construction material and an absolute decline in the use of construction lumber. The average annual growth rate in the production of construction materials and of certain individual materials between 1965 and 1970 is shown in the following tabulation:

| | PERCENT OF ANNUAL GROWTH RATE 1965-70 |
|------------------------------------|---|
| Total construction materials | 5.4 |
| Of which: | |
| Cement | 5.6 |
| Precast concrete | 8.5 |
| Brick | 3.3 |
| Construction lumber | -1.8 |
| Construction steel | 7.1 |
| Silicate blocks | 2.3 |

The production of various major construction materials presented in Figure 34 is highlighted by the phenomenal increase in the use of precast reinforced concrete in Soviet construction.

Sporadic materials shortages, especially of cement primarily represent problems of distribution and inefficient usage as the Soviet distribution system frequently fails to get the proper construction materials to building sites at the appropriate times. Large quantities of materials are lost in transit or ruined by rough handling and inadequate transportation facilities. Once at the construction site, the use of materials is often less than optimal. As in other sectors of the Soviet economy, construction materials bottlenecks could be effectively eased without increasing output by developing a more efficient distribution system and by providing Soviet managers with incentives to achieve maximum efficiency in using these materials.

6. Domestic trade (U/OU)

Domestic trade, which includes the distribution of both producer goods and consumer goods, is conducted largely by state-controlled institutions according to decisions of the central planners. In 1971, domestic trade organizations employed nearly 8 million people, or about 6% of the labor force. Producer goods (raw materials plus semifinished and finished goods) are distributed through the material-technical supply network. A network of state-operated retail trade outlets, state-controlled cooperative stores, and collective farm markets handle the distribution of

FIGURE 34. Production of principal construction materials (U/OU)

| | 1950 | 1955 | 1960 | 1965 | 1970 | 1971 |
|---|------|-------|-------|-------|-------|-------|
| Cement (millions of metric tons)..... | 10.2 | 22.5 | 45.5 | 72.4 | 95.2 | 100.3 |
| Construction steel (millions of metric tons)*. | 5.1 | 7.5 | 12.6 | 19.6 | 28.0 | na |
| Construction lumber (millions of cubic meters)*..... | 78.8 | 109.2 | 127.2 | 102.6 | 93.8 | na |
| Precast reinforced concrete (millions of cubic meters)..... | *1.1 | *4.9 | 30.2 | 56.1 | 84.6 | 90.9 |
| Rock products (millions of cubic meters)... | 62.0 | 174.0 | 314.0 | 364.0 | 481.0 | 538.0 |
| Wall materials**..... | 13.0 | 25.6 | 44.5 | 44.6 | 52.9 | 54.4 |

na Data not available.

*Estimated.

**Comprises brick, dimension stone, and block.

consumer goods. In addition, an extra-legal sphere of trade exists as a result of the chronic failure of the state to satisfy fully consumer demand.

a. Producer goods

The State Committee for Material-Technical supply is the principal agency that supplies industrial and construction enterprises with raw materials, semifabricates, and equipment. This organization converts aggregate distribution plans supplied by the State Planning Committee into operational documents to be administered through central and territorial organs. Twenty-one main administrations distribute major industrial raw materials such as metals and fuels, and 11 similar bodies distribute equipment and instruments to enterprises under construction or being remodeled. Territorial administrations distribute producer goods through more than 4,000 supply and sales organizations, bases, and trusts that provide materials directly to enterprises and organizations.

A few ministries have supply administrations that are not subordinate to the State Committee for Material-Technical Supply; these agencies are strictly within the individual ministerial hierarchies. As a rule, they are not involved in actual distribution but are concerned primarily with planning and administrative functions. However, some of these ministries or parts thereof (railroads, the maritime fleet, river fleet, civil aviation, communications, transport construction, power and electrification, and gas) actively participate in the distribution of goods. A separate organization distributes industrial goods such as farm machinery, fertilizer, and construction materials directly to the farms.

b. Consumer goods

Consumer goods are distributed through state and cooperative stores and through the collective farm

markets; the former category accounts for virtually all retail trade (Figure 35). Collective farm markets are subject to a minimal amount of indirect state influence exerted through local trade administrations, which appoint market directors and sanitary inspectors. The state's purchasing and pricing policies of farm products have a more important role in determining the supply of and demand for goods offered for sale on the collective farm markets.

(1) *State-controlled stores*—The state-controlled retail trade network is divided into state stores, which handled about 70% of total retail trade in 1971, and consumer cooperatives. In addition to their retail outlets, both the state stores and the cooperatives also operate public dining outlets, which range from snack bars to restaurants.

(a) *STATE STORES*—The network of retail outlets is supervised primarily by the Ministry of Trade, which operates food and department stores. About two-thirds of all state-controlled retail sales are accounted for by outlets of this ministry. Public dining outlets operated by the Ministry of Trade account for about three-fourths of the total public dining turnover.

Supplementing the outlets of the Ministry of Trade are worker supply organizations attached directly to

FIGURE 35. State, cooperative, and collective farm market retail sales, including public catering (U/OU) (Billions of rubles)

| YEAR | TOTAL SALES | STATE AND COOPERATIVE SALES | | | COLLECTIVE FARM MARKET SALES |
|-----------|----------------|--------------------------------|-------|------------------|---------------------------------------|
| | | Total | State | Coopera- tive | |
| 1950..... | 40.9 | 36.0 | 26.1 | 9.9 | 4.9 |
| 1955..... | 55.0 | 50.2 | 34.7 | 15.5 | 4.8 |
| 1960..... | 82.3 | 78.6 | 54.9 | 23.7 | 3.7 |
| 1965..... | 108.4 | 104.8 | 73.8 | 31.0 | 3.6 |
| 1971..... | 169.7 | 165.6 | 116.8 | 48.8 | 4.1 |

producing enterprises, usually in remote areas. For workers in selected priority industries, these organizations also provide high quality goods not generally available in regular stores. Worker supply organizations account for roughly one-tenth of total state retail trade.

There are also a number of state agencies that have specialized distribution networks for their products. For example, the Ministry of Health has retail outlets for the sale of drugs, medicines, and associated products; the Ministry of Communications distributes and sells newspapers and periodicals; and the Ministry of Culture operates bookstores.

(b) **COOPERATIVE STORES**—Consumers' cooperatives constitute a separate trade network, paralleling that of the state stores but designed primarily to serve rural areas. Cooperatives are usually composed of residents from a single village. Their primary function is to establish and run local stores and restaurants. In 1971, cooperatives operated 370,500 trade enterprises and 76,000 cafeterias and restaurants. Nominally the cooperative system is controlled by its members, but the state actually exercises strict control over the products sold, prices, and profits.

(2) **Collective farm markets**—Collective farm markets provide sales outlets for agricultural products retained by the farms after meeting planned deliveries to the state, for produce from individual private plots, and for certain nonagricultural goods such as handicrafts produced by individual craftsmen. The products sold in the collective farm markets are generally of high quality, a fact reflected in their prices, which are largely determined by supply and demand. These prices are usually higher than the fixed prices found in the state stores. The collective farm markets represent an important source of food supply for urban residents. Although sales in these markets accounted for only 4% of total retail sales of food in 1971, they played a significant role in supplying the population with a number of items normally in short supply in state stores, particularly perishable foods such as eggs, meat, fruits, and vegetables.

c. *Illegal activities*

Although officially unreported, the magnitude of illegal private economic activity in the U.S.S.R. is vast and involves producer goods as well as consumer goods and services. Chronic shortages have encouraged black markets in which scarce products and personal services are sold at high prices. Shortages of machinery and materials in the producing sectors of the economy have led enterprise managers to hire expeditors to insure that the enterprise is supplied with the resources

needed to fulfill its output plan. These expeditors often must circumvent the normal supply channels, using bribes, influence, stolen goods, or other illegal methods to procure the necessary materials.

Illegal activities also encompass a wide range of ingenious ventures in the consumer sector, including a flourishing trade in moonshine liquor, the selling of goods stolen from the state, and the provision of services by moonlighting taxi drivers, doctors, and others supplying services to those willing to pay for individual treatment. Persons caught engaging in illegal economic activity are dealt with severely, with punishment ranging up to and including death for large scale abuses. Nevertheless, the rewards from these activities are sufficiently great to sustain the system even in the face of harsh repressive measures. In some areas such as Georgia and Armenia economic chicanery is a way of life.

D. International economic relations (S)

1. Introduction

The U.S.S.R.'s foreign trade has grown at a rapid 8% average annual growth rate during the past decade. Total trade turnover (imports plus exports) more than doubled during the period 1960-71—from US\$11.2 billion to \$26.3 billion^a (Figure 36). Although trade with the Communist world accounts for two-thirds of Soviet foreign trade, the growth in trade with the industrialized West has accelerated since 1965, spurred by increased Soviet demands for Western machinery and technology and by a concomitant rise in the availability of long-term credits offered by the West. Soviet imports of Western grain caused by occasional shortfalls in domestic grain production and a high priority livestock program are an increasingly important feature of Soviet trade with the West. Grain imports from the West during 1973 alone are expected to approximate \$1.6 billion.

2. Foreign trade organization and control

Soviet foreign trade is conducted as a state monopoly to serve the needs of the Soviet economy as determined by the authorities. The Ministry of Foreign Trade provides central planning and direction, preparing the foreign trade plan with the participation of the State Planning Committee, adjusting it quarterly, and exercising control over its fulfillment. It also participates in formulating the foreign exchange plan along with the State Planning Committee, the State Bank, and the Ministry of

^aCalculated in 1972 dollars.

FIGURE 36. Value of foreign trade, by geographic area (\$)
(Millions of U.S. dollars)

| | 1960 | 1965 | 1971 |
|------------------------------|-------|-------|--------|
| Exports..... | 5,564 | 8,175 | 13,806 |
| Communist countries..... | 4,211 | 5,556 | 9,018 |
| Eastern Europe..... | 3,074 | 4,553 | 7,241 |
| China..... | 817 | 192 | 78 |
| Cuba..... | 175 | 375 | 669 |
| Other*..... | 145 | 437 | 1,030 |
| Non-Communist countries..... | 1,352 | 2,618 | 4,788 |
| Developed..... | 983 | 1,438 | 2,710 |
| Less-developed..... | 338 | 911 | 1,380 |
| Other**..... | 31 | 270 | 698 |
| Imports..... | 5,628 | 8,058 | 12,479 |
| Communist countries..... | 3,978 | 5,610 | 8,177 |
| Eastern Europe..... | 2,795 | 4,673 | 7,257 |
| China..... | 848 | 226 | 76 |
| Cuba..... | 104 | 342 | 321 |
| Other*..... | 231 | 370 | 523 |
| Non-Communist countries..... | 1,650 | 2,448 | 4,302 |
| Developed..... | 1,080 | 1,601 | 2,859 |
| Less-developed..... | 564 | 845 | 1,413 |
| Other**..... | 6 | 2 | 30 |
| Trade balance***..... | -64 | 117 | 1,327 |
| Communist countries..... | 233 | -54 | 841 |
| Eastern Europe..... | 279 | -120 | -16 |
| China..... | -31 | -34 | 2 |
| Cuba..... | 71 | 33 | 348 |
| Other*..... | -86 | 67 | 507 |
| Non-Communist countries..... | -298 | 170 | 486 |
| Developed..... | -97 | -163 | -149 |
| Less-developed..... | -226 | 66 | -33 |
| Other**..... | 25 | 268 | 668 |

*Albania, Mongolia, North Korea, North Vietnam, and Yugoslavia.

**Includes Hong Kong. Most of the exports are military related exports to non-Communist less-developed countries.

***A minus sign indicates net imports.

Finance. The Ministry of Foreign Trade conducts negotiations and concludes commercial treaties and agreements with foreign countries, directs the activities of about 50 subordinate foreign trade corporations which supervise day-to-day trade in particular commodities or with particular geographic areas, and formulates and carries out Soviet customs policy. Also in the area of international economic relations, the State Committee for Foreign Economic Relations is charged with the development of economic contacts with foreign countries, but its principal duties relate to technical cooperation and the construction of installations abroad.

In recent years the State Committee for Science and Technology has become increasingly active in foreign economic activities. Although its functions have not been specified publicly, they appear to include the coordination of technical and scientific cooperation

with foreign companies and countries. The committee also plays an important role in deciding on imports of advanced Western technology and equipment. It has a foreign trade corporation which carries on scientific and technical exchange with foreign countries and provides assistance to Soviet organizations in the implementation of scientific and technical agreements with their foreign counterparts.

3. Geographic distribution of Soviet foreign trade

The U.S.S.R. traditionally has pursued a policy of maximum economic independence from the West. Planners attempt to meet most Soviet requirements for foreign goods by scheduling deliveries from the European Communist countries. As a result, about two-thirds of Soviet foreign trade is conducted with other Communist countries, primarily in East Europe (Figure 37). The other one-third is with non-

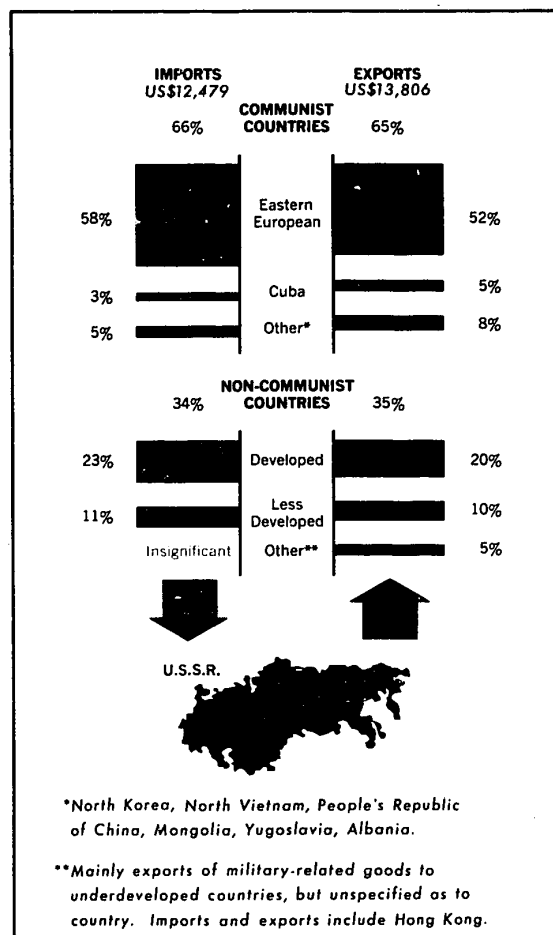


FIGURE 37. Main groups of trading partners, 1971 (\$)

Communist countries; three-fifths of this is with the developed countries, largely on a hard currency basis. Trade with the developed West has grown by almost 11% during 1966-71, the most rapid rate of increase among the U.S.S.R.'s major trading areas. Conversely, trade with China, which accounted for 15% of Soviet trade turnover in 1960, fell to a negligible proportion of Soviet trade by 1970 before a reversal took place.

The U.S.S.R. is largely a self-sufficient economic entity with vast and diverse resources, a well-developed but relatively obsolescent industrial base, and a large internal market. In aggregative terms, foreign trade plays only a small role in the economy. Exports (or imports) represent less than 3% of GNP compared with 4.5% in the United States. In recent years, however, the U.S.S.R. has tempered its policy of self-sufficiency to obtain from the West the advanced technology and industrial equipment it needs to accelerate growth and to reduce its acknowledged lag in productivity behind the leading Western economies. Imports of technology and equipment account for a substantial portion of the increasing volume and relative share of trade with the West.

Soviet trade with East Europe—almost 85% of Soviet trade with all Communist countries—is conducted largely on a bilateral basis and is one of the chief instruments for maintaining Soviet hegemony over the area. Soviet economic control over East Europe is also implemented through the Council for Economic Mutual Assistance (CEMA), a Soviet inspired organization designed to foster the economic integration and specialization of production in East Europe. The U.S.S.R. has been disappointed with the lack of progress by CEMA towards these goals, primarily because of rising nationalism in some of these countries. East European leaders, however, appear to be increasingly aware of the need to work within CEMA to upgrade their economies. They recognize that imported Western technology and equipment is not a panacea for their economic ills, and that they are hard put to generate enough saleable exports to pay for more than a fraction of their needs. An important move toward furthering integration was the establishment of CEMA's International Investment Bank in January 1971. The bank's primary function is the financing of major investment projects deemed to be beneficial to most of the member countries. As of February 1973 the bank had provided financial support for at least 26 separate projects, all in East Europe, valued at roughly \$400 million.

The level of Soviet trade with the remaining Communist nations has fluctuated over the past decade, with the \$2.7 billion in trade with these nations in 1971 only 12% above the 1960 level. The distribution of Soviet trade among these nations has

changed significantly, however, reflecting changing political relationships. Trade with China, for example, fell sharply during the past decade from \$2.1 billion in 1959 to \$47 million in 1970, but rose to \$164 million in 1971. Conversely, trade with Cuba has expanded rapidly as the Soviets have felt obligated to support the Cuban economy. Soviet-Cuban trade turnover in 1971 was \$1.2 billion, or more than four times the level of trade in 1960. The vicissitudes of Soviet political relations with Yugoslavia have been reflected in the level of trade; Yugoslavia is now a significant trading partner of the U.S.S.R., with trade between the two nations exceeding \$600 million in 1971.

The East European countries should maintain their dominant position among Soviet trading partners during the 1970's as the U.S.S.R. probably will continue to work for forced economic integration within CEMA. Similarly, ongoing Soviet support for Cuba and the growing rapport with Yugoslavia are likely to lead to the further growth of trade with these nations. Soviet trade with the developed West should continue its steady rise at least into the mid-1970's as the U.S.S.R. is expected to rely increasingly on the West for high technology imports of plant and equipment. The United States, in particular, could well become a major trading partner both as a result of the growing rapprochement with the U.S.S.R. and the Soviet demand for U.S. grains and advanced technology.

4. Commodity composition of foreign trade

The composition of Soviet imports and exports remained basically unchanged during 1960-1971 (Figure 38). Soviet imports are dominated by machinery, equipment and consumer goods. These categories have accounted for about two-thirds of total Soviet imports since 1965. Almost three-fourths of Soviet imports of machinery and equipment originate in East Europe. The composition of consumer goods imports has shifted over the past decade: during 1966-68 imports of food declined, but they have increased since that time and will rise dramatically during 1971-73 as a result of the 1972 Soviet grain crop shortfall. Imports of manufactured consumer goods more than doubled from 1965 to 1971. Although such imports from the developed West have risen rapidly during recent years, the hard currency required to pay for massive grain imports during 1972-73 may lead to a fall in the level of manufactured consumer goods imported from the West, with some compensatory increase through increased imports of similar goods from East Europe. Soviet imports of machinery and equipment, essential to meet key plan goals, however, should continue to increase steadily during the 1970's.

FIGURE 38. Commodity composition of trade
(Percentages of total)

| | 1960 | 1965 | 1971 |
|--|-------|-------|-------|
| Imports* | 100.0 | 100.0 | 100.0 |
| Machinery and equipment..... | 29.8 | 33.4 | 34.0 |
| Fuels, lubricants, and related materials..... | 4.2 | 2.5 | 3.0 |
| Ores and concentrates..... | 5.6 | 3.9 | 1.0 |
| Base metals and manufactures.. | 9.7 | 4.9 | 6.0 |
| Chemicals..... | 2.7 | 4.7 | 6.0 |
| Rubber and rubber products.... | 3.5 | 2.5 | 1.0 |
| Wood and wood products..... | 1.9 | 1.9 | 2.0 |
| Textile raw materials and semi-manufactures..... | 6.5 | 4.4 | 5.0 |
| Consumer goods..... | 27.9 | 33.0 | 33.0 |
| Other and unspecified..... | 8.4 | 9.0 | 11.0 |
| Exports* | 100.0 | 100.0 | 100.0 |
| Machinery and equipment..... | 20.5 | 20.0 | 20.0 |
| Fuels, lubricants, and related materials..... | 16.2 | 17.0 | 18.0 |
| Ores and concentrates..... | 4.4 | 3.8 | 3.0 |
| Base metals and manufactures.. | 15.1 | 16.3 | 15.0 |
| Chemicals..... | 2.7 | 3.0 | 3.0 |
| Wood and wood products..... | 5.5 | 7.3 | 6.0 |
| Textile raw materials and semi-manufactures..... | 6.4 | 5.1 | 3.0 |
| Consumer goods..... | 16.2 | 11.1 | 11.0 |
| Other and unspecified**..... | 13.1 | 16.5 | 23.0 |

*Figures may not add to totals because of rounding.

**Includes Soviet exports of diamonds, platinum group metals, and nickel.

Soviet exports continued to be dominated by fuels, raw materials, and semifinished materials. Foremost among these have been exports of petroleum and petroleum products, which almost tripled from 1960 to 1971. The growth in Soviet exports of machinery and equipment has paralleled the overall growth in total Soviet exports during 1960-71. Exports of food have varied with Soviet crop yields, rising during the late 1960's to \$1.2 billion in 1971.

The composition of Soviet exports should remain largely unchanged during the next few years. Exports of petroleum products are expected to continue to grow, bolstered by continued increases in world price levels. Soviet exports of natural gas will become a major Soviet item during the 1970's following the completion of pipeline networks currently under construction. Alternatively, food exports can be expected to decline over the short run due to the recent grain crisis. Exports of machinery and equipment should continue their steady rise, particularly to East Europe and the less developed nations. The potential for increased Soviet exports of machinery and equipment to industrialized Western markets will remain relatively limited.

5. Exchange rate and international payments position

Soviet currency is not convertible and its rate of exchange vis-a-vis foreign currencies serves only as an accounting device for registering foreign trade and other international payments. There is no systematic relationship between Soviet domestic prices and prices in Soviet foreign trade. Commodity prices in trade with non-Communist countries are generally in line with world market prices; in trade with other Communist countries, whose domestic prices are also unrelated to world market prices, prices must be negotiated on the basis of world market prices.

Soviet hard currency payments are generally in deficit as the U.S.S.R. has failed to generate sufficient hard currency exports to the developed Western countries to offset increased imports of equipment and technology. To meet these deficits, the U.S.S.R. has sold gold and obtained government-guaranteed credits, both medium-term and long-term, from the developed West as follows (in millions of US dollars, 1960-72):

| YEAR | HARD CURRENCY DEFICIT | SALES OF GOLD* | NET MEDIUM- AND LONG-TERM CREDITS (GOVERNMENT-GUARANTEED) |
|---------------|-----------------------|----------------|---|
| 1960 | 278 | 150 | 86 |
| 1961 | 193 | 310 | 89 |
| 1962 | 267 | 240 | 64 |
| 1963 | 310 | 525 | -4 |
| 1964 | 533 | 520 | 8 |
| 1965 | 215 | 490 | 24 |
| 1966 | 267 | 45 | 06 |
| 1967 | **24 | 10 | 24 |
| 1968 | (18) | 10 | 257 |
| 1969 | 315 | 0 | 303 |
| 1970 | 517 | 5 | 302 |
| 1971 | 309 | 20 | 217 |
| 1972*** | 600 | 250-300 | 337 |

*Rounded to nearest \$5 million.

**Surplus.

***Preliminary estimate.

Until 1966 the U.S.S.R. relied primarily on gold sales to finance its hard currency deficits. During 1960-65, for example, the U.S.S.R. sold more than \$2 billion worth of gold to finance its trade deficit with the West. This reduction in Soviet gold reserves plus the greater availability of Western credits has caused the Soviets to shift increasingly to the latter as the chief element in financing Soviet purchases in the West. Although huge imports of Western grain and other goods during 1973 are likely to result in a record Soviet hard currency deficit, the Soviets will have little

difficulty financing it 'rough a combination of gold sales (reserves are adequate as domestic production is rising rapidly), U.S. government-backed agricultural credits, other government-guaranteed credits, and short- and medium-term, nonguaranteed credits.

The increasing ability of the U.S.S.R. to finance its imports in the West is in part a function of the continued growth of Soviet banking institutions in West Europe. The U.S.S.R. owns banks in four major West European financial centers, which together hold assets in excess of \$2 billion. These banks are an important factor in financing Soviet trade with the West and are a major source of funds for the U.S.S.R. They have established excellent reputations in Western currency markets, which enable them to attract Eurocurrency deposits at prime rates and tap other outside sources of funds.

6. Soviet foreign aid

Since World War II the U.S.S.R. has undertaken an impressive program of economic and military assistance to both Communist and non-Communist less developed countries, although Moscow has been more cautious in making new commitments to the latter group in recent years. A total of \$24.5 billion of economic assistance has been extended, of which about \$16.2 billion was provided to Communist countries.

Aside from \$1 billion in aid extended to Poland in 1971, following the workers' riots in the previous year, and some development aid to Bulgaria, nearly all of the U.S.S.R.'s economic assistance extended to Communist countries since 1965 has been to non-European countries. Nearly 40% of Soviet economic aid extensions since 1965, about \$4.1 billion, has been directed toward Cuba, which in 1972 alone received aid commitments of more than \$1 billion—\$370 million in development credits and most of the remainder in balance of payments assistance. North Vietnam and Mongolia were the next largest recipients of Soviet aid, receiving about \$1.8 billion and \$1.3 billion, respectively, since 1965. Soviet economic assistance credits are generally extended on generous terms with interest at about 2% to 3% annually and repayment in goods stretched out over 10 years or more. In 1972, however, the Soviets extended a credit to Yugoslavia which carries an interest rate of 4.5%.

Approximately 85% of the Soviet aid extended to Communist countries has been drawn, and most of the aid still on the books is scheduled to be drawn by 1975. Communist countries have drawn a larger percentage of the aid extended than have the non-Communist, less developed countries. This is largely because of the

special bilateral economic and political relationships between the U.S.S.R. and the other Communist countries; the U.S.S.R. is the single most important trading partner of these countries. In addition, due to the close cooperation between the State Planning Committee and its counterparts in the other Communist countries, Soviet aid commitments are embodied not only in the national economic plans of these countries but also in their long-term annual trade agreements with the U.S.S.R. This special relationship does not exist between the U.S.S.R. and the non-Communist, less developed countries. Moreover, the implementation of aid has been more rapid in the Communist countries, especially in Communist East Europe, compared with the developing non-Communist countries because of the higher level of native skills and the official emphasis on economic growth.

Soviet economic aid to non-Communist, less developed countries has been extended mostly to public sector industrial projects under credits repayable in 12 years at 2.5% to 3% interest. Since 1965, the U.S.S.R. has extended a larger percentage of its aid in the form of medium-term credits which carry shorter repayments periods and higher interest rates and sometimes require downpayments. These credits usually finance the purchase of machinery and equipment, rather than the purchase of complete plants, and sometimes are taken up by the private sector of a developing country.

The level of annual extensions of Soviet economic aid to non-Communist, less developed countries has varied widely from a low of \$70 million in 1962 to a record of \$1.3 billion in 1966. The fluctuations that have occurred are to be expected in a program with major commitments to projects, such as the Aswan Dam, and development plans that often require several years for implementation. For the most part, recent peak years have reflected extensions to countries which have initiated new development plans; the low years often meant that major aid recipients were working off credits previously extended. Actual drawings of economic aid to non-Communist, underdeveloped countries total over \$4 billion. Deliveries to these countries, which are the most reliable indicator of the scale of foreign aid in any given year, rose to \$375 million in 1964 but have failed to achieve any sustained growth since that time. On the other hand, a rapid rise in repayments in the face of a relatively constant level of deliveries, has resulted in a reduction of the net flow of Soviet aid to the developing countries. In 1972, repayments by these countries for Soviet economic aid debts rose to an estimated \$235 million, the equivalent of about 75%

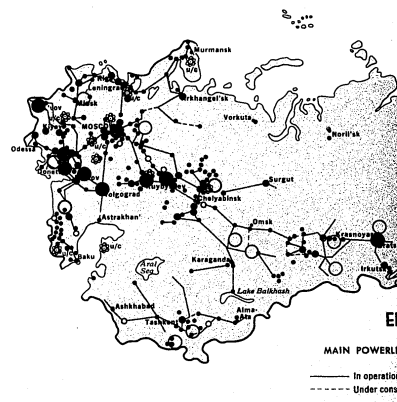
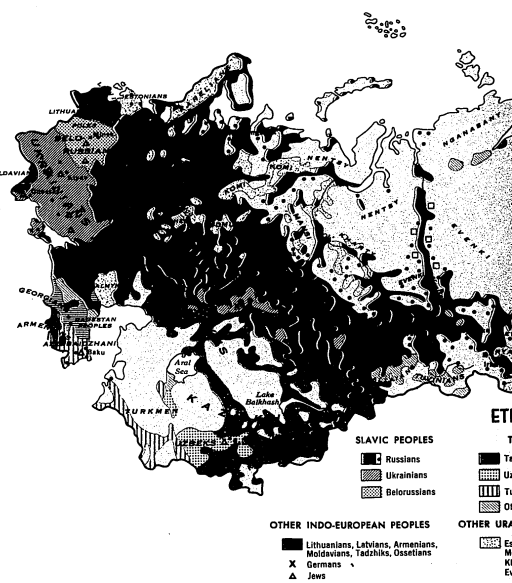
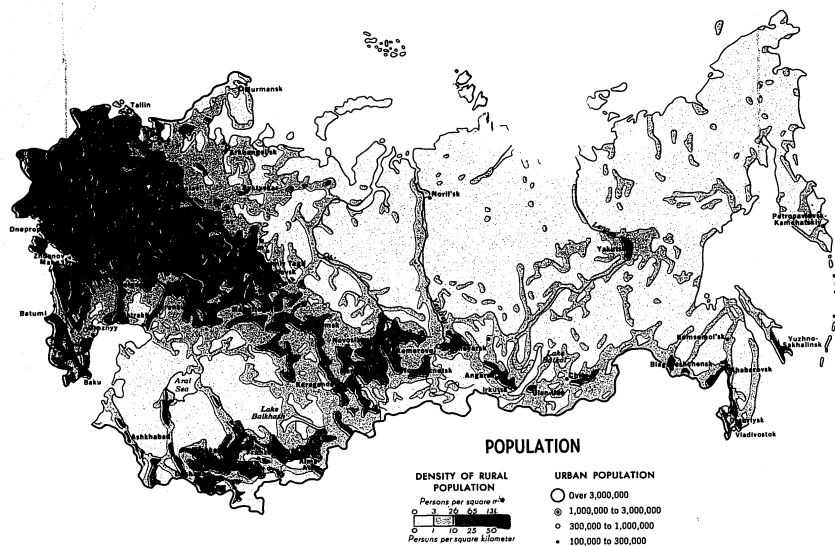
of new economic aid extended during the year. By the end of 1972, these countries had repaid a total of about \$1 billion of their principal debt to the U.S.S.R., or slightly more than one-fourth of Soviet aid deliveries under credits. About half has been paid by Egypt and India, the two leading recipients of Soviet economic aid.

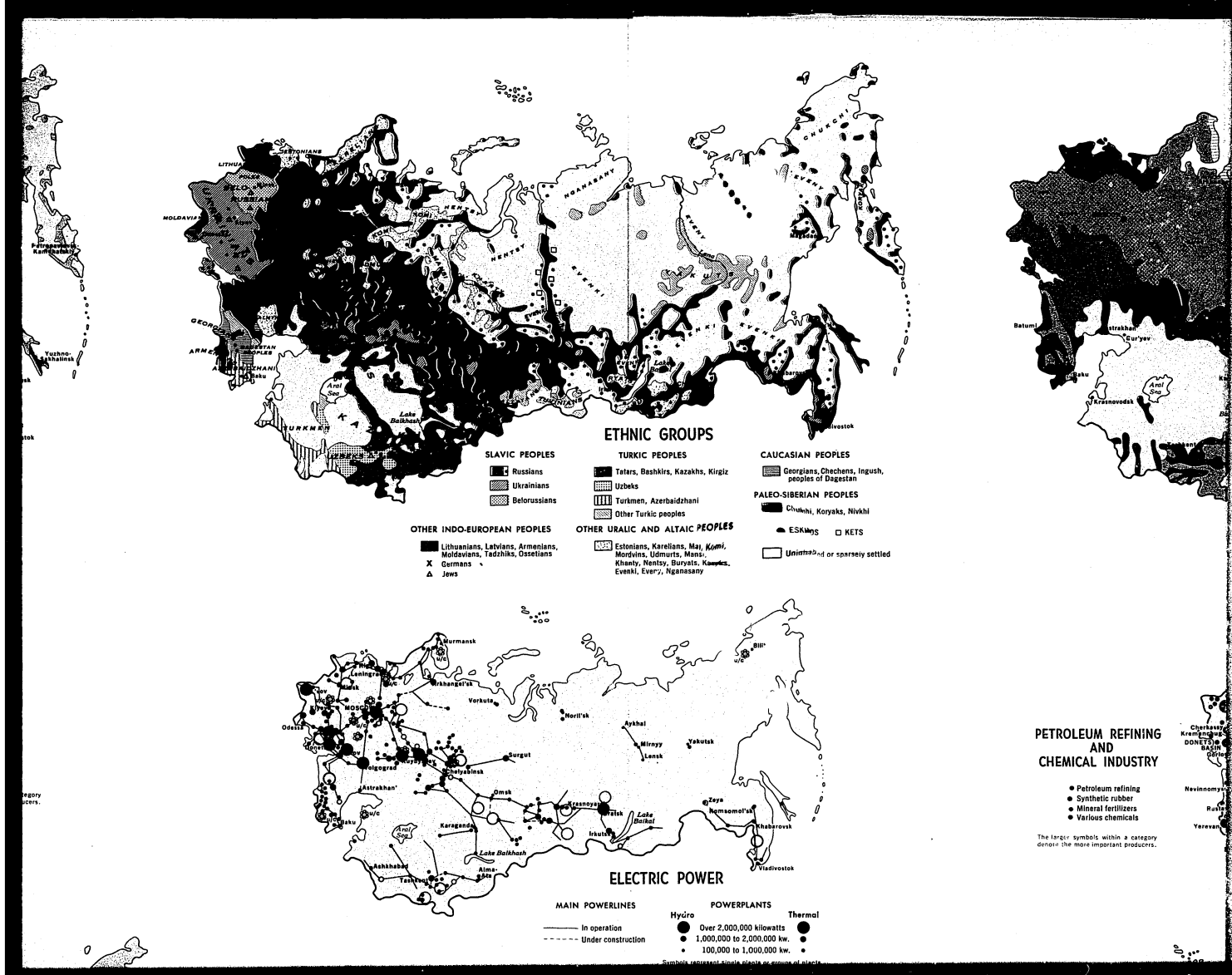
Compared with Western aid, the amount of Soviet aid is small, but because of Soviet propaganda, the timing of new aid commitments, and the kinds of projects undertaken, the political impact sometimes has overshadowed the volume of aid or its ultimate economic effect. Nevertheless, the U.S.S.R. has been applying greater selectivity in its aid extensions. In 1972, for example, Moscow extended new aid to only five countries. It is earmarking most of its new aid for a few countries in the Middle East and South Asia. Of total Soviet assistance extended during 1966-72, 77% was allocated to the Middle East and South Asia, compared with 70% in 1960-64. Meanwhile, Africa's share of the total fell from 28% to 13% and that of Latin America rose to 10%.

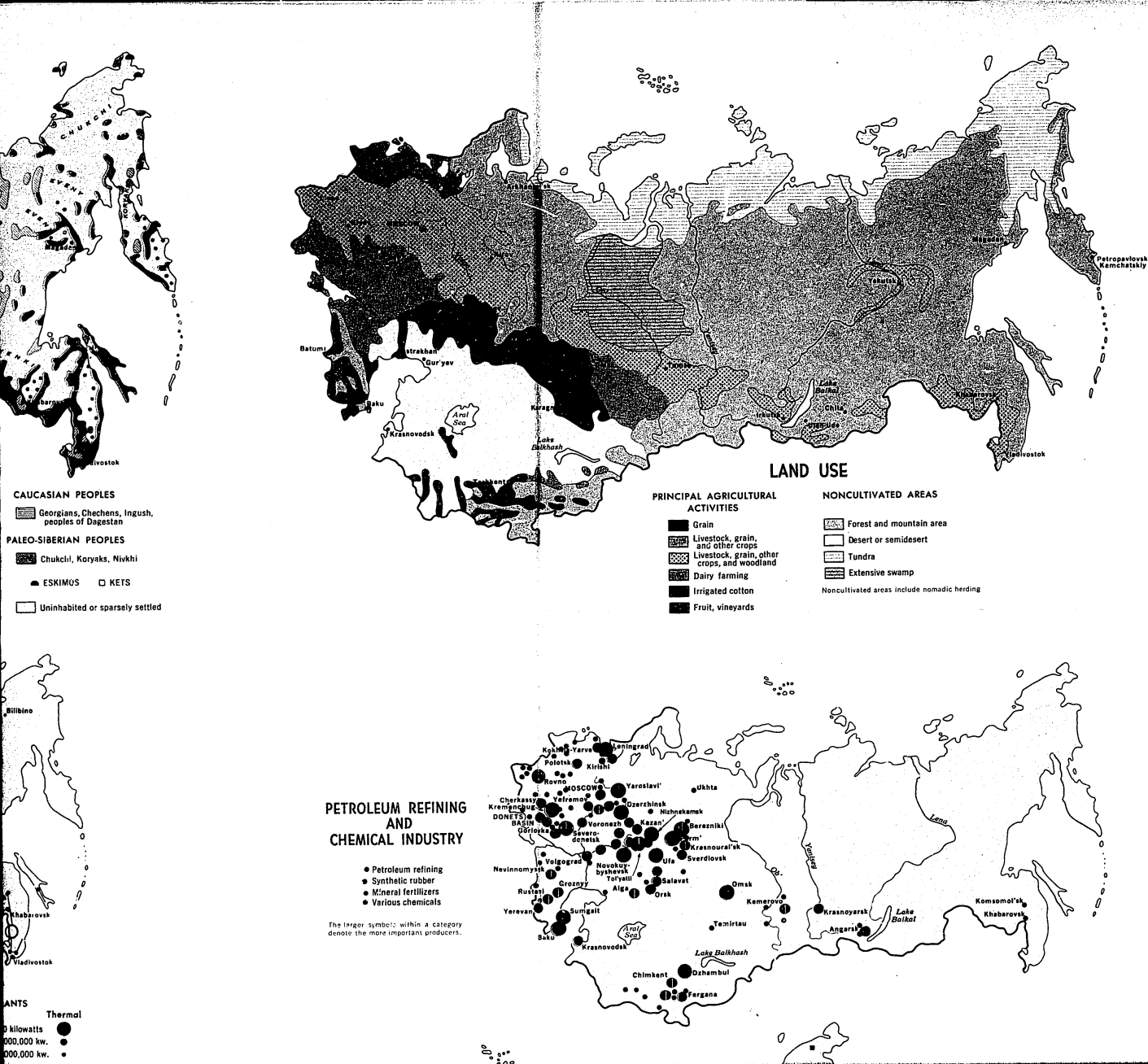
Since 1955, the U.S.S.R. has committed \$8.9 billion of military aid to underdeveloped, non-Communist countries; over half of this amount has been extended since 1966. The Soviets' extension of only \$363 million

in new arms assistance in 1972 reflected a return to more traditional patterns from the unusually high level of 1970-71 caused by substantial acquisitions by Egypt to build up its air defenses and by India to prepare for its war with Pakistan. An estimated \$7.5 billion or 85% of Soviet military equipment on order had been delivered by the end of 1972. About 80% of Soviet arms exports have been delivered to the Middle East and South Asia, with the remainder allocated to East Asia (12%) and Africa (8%). Over three-fourths of Soviet military exports in 1972 went to Egypt, Syria, Iraq, and India, with Egypt alone receiving more than 35% of the total.

The Soviet military aid program generally has been an effective instrument for establishing a position of influence in the third world. Soviet military equipment has been priced competitively and credit terms are liberal. The price of Soviet military hardware is usually lower than for comparable Western equipment. In addition, Moscow usually allows a discount, which varies among recipients but has averaged about 40% of the value of the delivered material. Cash sales make up only 5% of Soviet exports of military aid, with the remainder being financed on 8- to 10-year credits, after a 1- to 3-year grace period, at 1% to 2.5% interest.



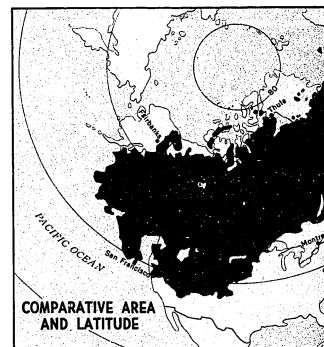
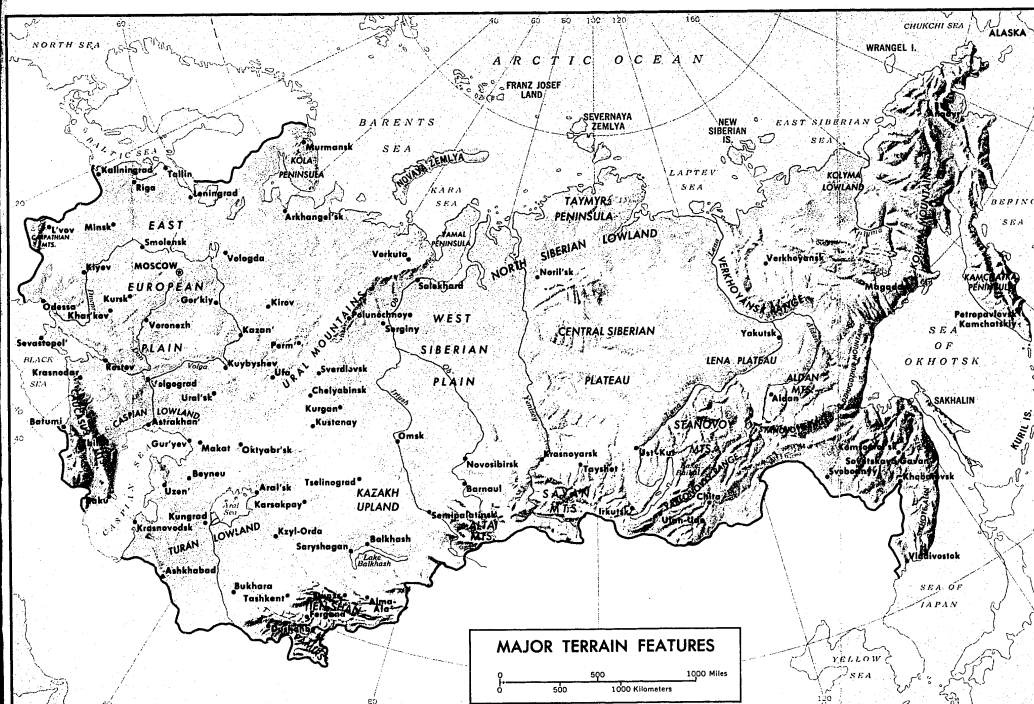
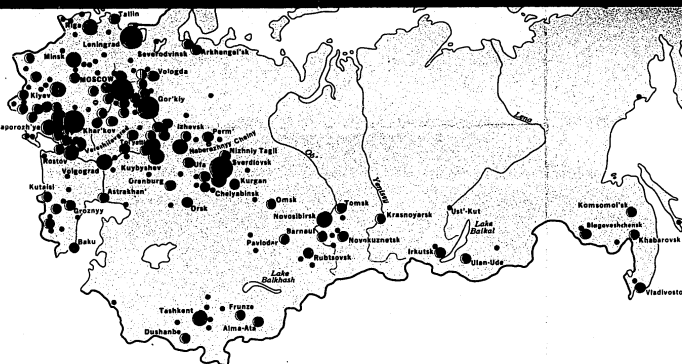




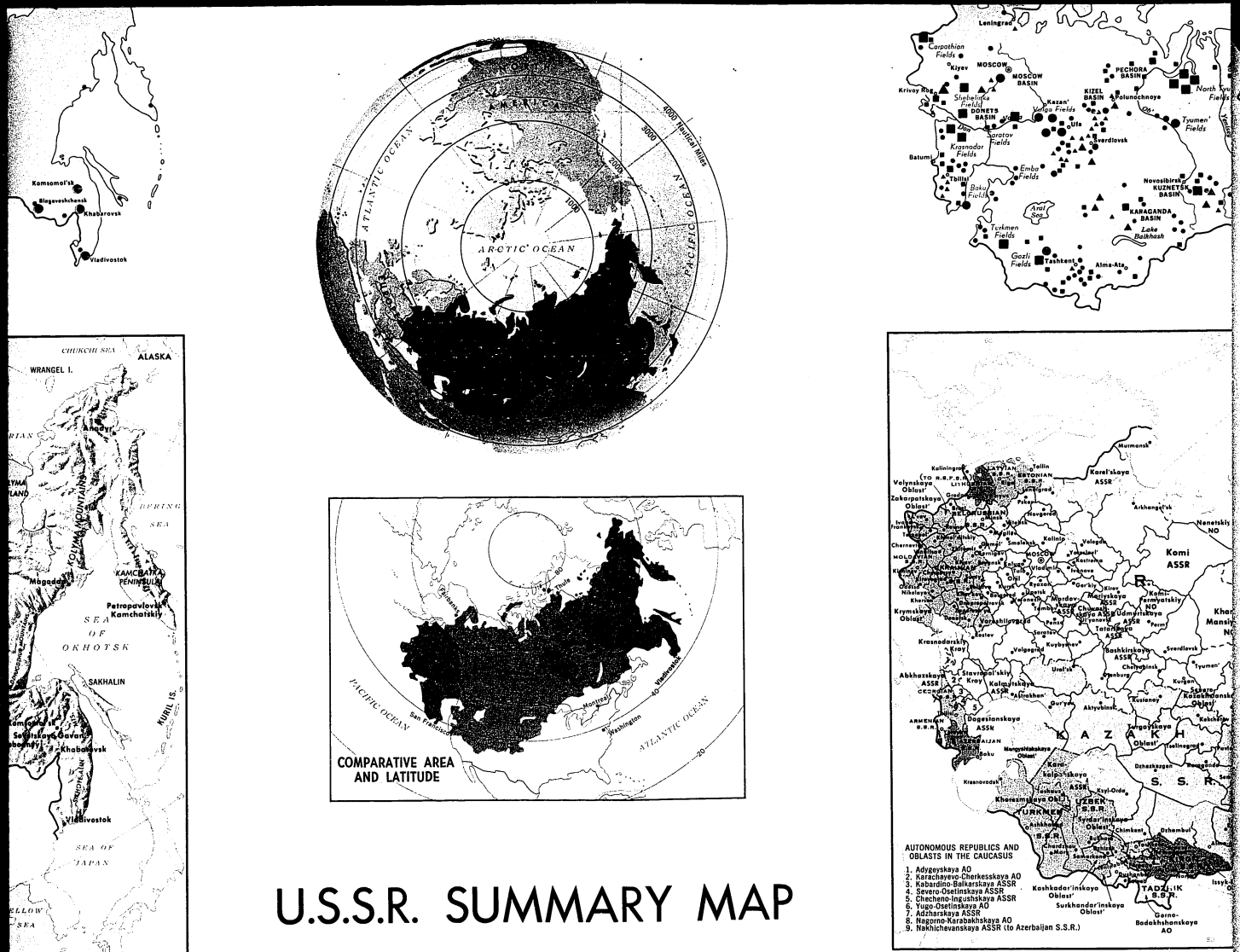
MACHINE BUILDING AND METALWORKING

- Tractors, farm equipment
- Automobiles and trucks
- Other transport equipment
- Other machine building and metalworking

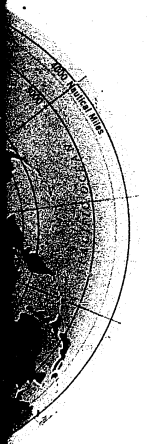
The larger symbols within a category denote the more important producers.



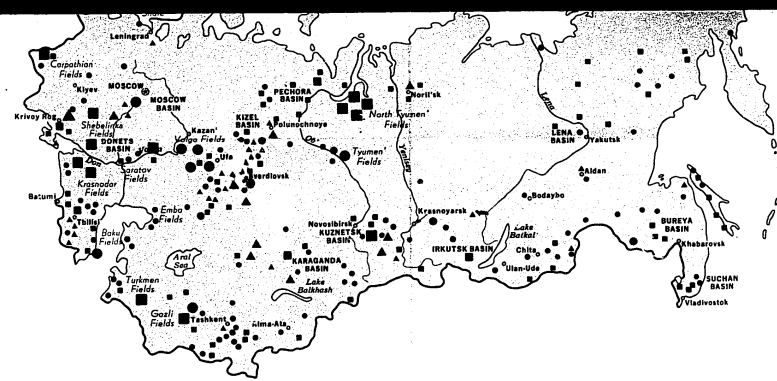
U.S.S.R. SUMMA



U.S.S.R. SUMMARY MAP



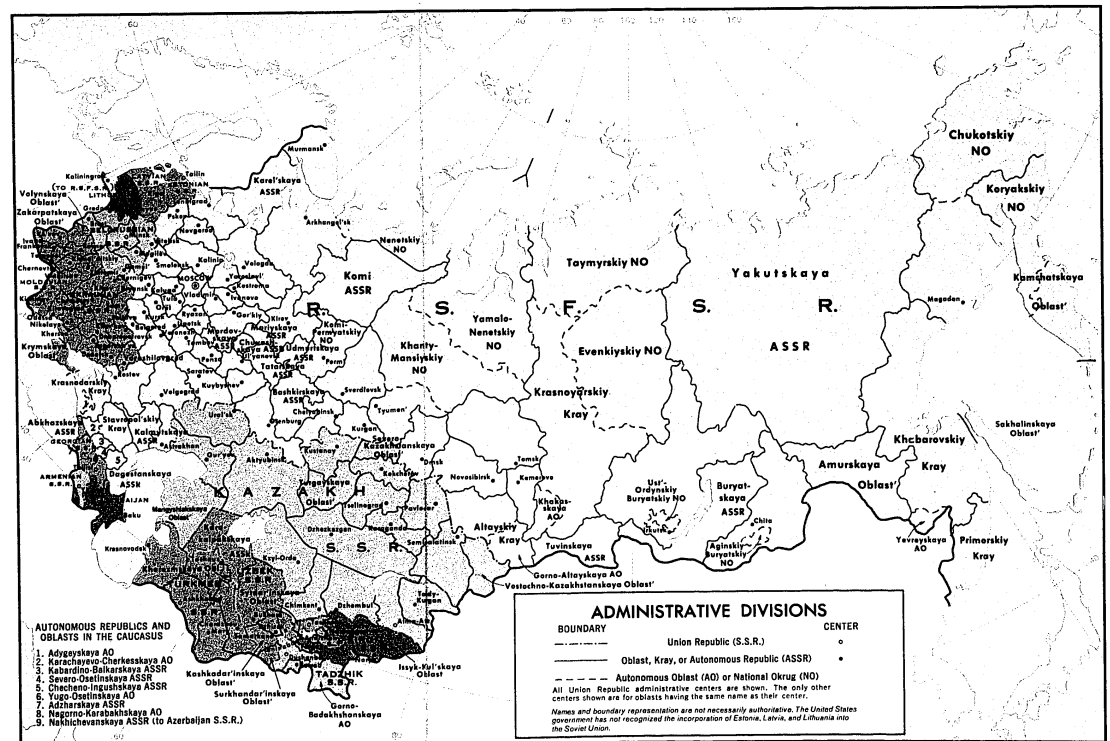
RY MAP



FUELS AND METALLIC MINERALS

| | |
|---------------|-----------------|
| ■ Coal | ■ Nickel |
| ● Brown coal | ▲ Copper |
| ▲ Crude oil | ● Lead and zinc |
| ◆ Natural gas | ▲ Aluminum |
| ■ Iron | ■ Tin |
| ● Manganese | ● Gold |
| ● Chromite | |

The larger symbols within a category denote the more important producers.



- AUTONOMOUS REPUBLICS AND OBLASTS IN THE CAUCASUS**
1. Adygayskaya AO
 2. Karachayev-Cherkesskaya AO
 3. Kabardin-Balkarskaya ASSR
 4. Severo-Osetinskaya ASSR
 5. Checheno-Ingushskaya ASSR
 6. Yugo-Osetinskaya AO
 7. Adzharskaya ASSR
 8. Nagorno-Karabakhskaya AO
 9. Nakhichevanskaya ASSR (to Azerbaijan S.S.R.)

ADMINISTRATIVE DIVISIONS

BOUNDARY

Union Republic (S.S.R.)

Oblast, Kray, or Autonomous Republic (ASSR)

Autonomous Oblast (AO) or National Okrug (NO)

Center

All Union Republic administrative centers are shown. The only other centers shown are for oblasts having the same name as their center.

Names and boundary representation are not necessarily authoritative. The United States government has not recognized the incorporation of Estonia, Latvia, and Lithuania into the Soviet Union.

SECRET

SECRET